DOCTOR OF PHILOSOPHY

From Hyperreal Sonic-Images to Phonographic Sound: A Portfolio of Original Compositions

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A Portfolio of Original Compositions

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Abstract

This composition portfolio explores disembodied phonographic sound through nine original works; *'Tidal Streams'*, *'PLAY'*, *'Tryst'*, *'Everyday Mimesis; Grey Day'*, *'Vivified'*, *'Thoroughfares'*, *'Tempest in a Teacup'*, *'Tacet'* and *'Empire Drive'*. From the outset of this creative journey, phonography was applied as a compositional resource, and used foremost as a mechanism for generating musical (and compositional) pathways. The early compositions born from exploring this process were developed through devising contextual frameworks, utilising the mimetic-aural[1] and surreal[2] characteristics of recorded sound. As the body of work developed over time, the implementation of phonographic process became more significant to the compositional methodologies explored, changing the focus of the kinds of musical languages (or sonic images) organised, which went on to centre more around the framing of place, time and space. This development materialised through exploring multichannel processes in octophonic (speaker and microphone) arrays and through spending time considering the parameters of the medium from both the perspective of a composer and a listener.

In an attempting to document the creative pathway outlined, this three part commentary is structured thematically rather than chronologically. This reflects the developments in the compositional approaches taken and the methodologies explored. The commentary is not formulated to provide a detailed account of every compositional decision, device or process considered and employed; it is foremost used to document the personal journey whilst attempting to provide insight into the final compositions and the train of thought which prevailed at the time. It is the case that what resonates with me will not resonate with another listener, but as a composer that is a risk that has to be taken.

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[1] This terminology is further discussed in the following section, but I would like to point out a fundamental understanding of this framework and terminology. Emmerson, S. 'The relation of language to materials', The language of electroacoustic music, Macmillan, 1986, pp 19.

[2] Fishman, R. 'Mimetic Space-unravelled', Organised Sound, Volume 13, Issue 02, 2008.

Chapter 1 provides a general introduction to the work by identifying the areas, ideas and themes that were visited and contemplated over the period of research. The discussion compares the experience of listening to recorded sound with the experience of listening to sound whilst physically experiencing an environment. This discussion identifies the unique characteristics that arise when exploiting disembodied recorded sound as a compositional resource. For example, the parameters and stylistic traits inherently involved when creating musical languages from (disembodied) recorded sound are identified. Existing theories, practices and practitioners have been discussed with a view to providing a context for the body of work in the portfolio. This involves a brief discussion around the influence of theoretical work from Denis Smalley and Simon Emmerson, and goes on to discuss the influence of approaches explored by Chris Watson, and perhaps most relevantly, Francisco Lopez and Bill Fontana. The compositional methodology section provides a brief insight into some of the consistent characteristics in the approaches explored. This discussion is intentionally general as the specific methodologies are outlined in relation to the relevant works, although more detailed information and instruction on the 'Sequential Spatialisation' technique and the 'Multi-Device Recording Methodology' as this was applied in a number of the works. The elaborate spatialisation and recording processes attempt to create more spatially complex and acoustically accurate sonic-images (or sound fields) from stereophonic sources over the octophonic speaker array; 'Sequential Spatialisation' allows stereophonic images to be systematically spatialised over an octophonic speaker array, and the Multi-Device Recording Methodology' utilises independent arrays of up to eight microphones (or four stereo pairs) at variable distances, enabling a number of portable recording devices to be synchronised in unique configurations and patterns during the act of field recording. The opening chapter closes by identifying the original contribution to knowledge, which relates to the 'Sequential Spatialisation' and 'Multi-device phonography' techniques.

Chapter 2 elaborates on the increasing influence of phonography over the compositional processes explored, focusing on the compositions that were born out of the platform afforded by the phonographic process, that frame a specific place, time and space. The opening discussion attempts to compare the growing impact of phonography over the approaches explored, which developed the kinds of sonic-images produced and the overall pathways pursued. Through expanding the sound collection processes, and in extending the application of phonography, different methodologies were created to devise spatially animated hyperreal sonic environments, without the need for sound abstraction and metaphoric representation (e.g. '*Thoroughfares*'). The following written commentaries focus on the works that heavily involve phonography, namely '*Everyday Mimesis; Grey Day*', '*Empire Drive*', '*Vivified*', '*Thoroughfares*' and '*Tacet*'.

Chapter 3 focuses on hyperreal works that are highly influenced by contextual factors, putting the emphasis on the studio-based compositional processes involved with creating hyperreal sonic-images through organising recorded sound. The discussion attempts to provide a general insight into the reasoning behind pursing phonographic representation through the practical work, which is realised through reflecting on the experienced gained from working with musical languages built from (disembodied) recorded sound. The commentaries discussed in this Chapter relate to compositions that rely heavily on contextual boundaries and metaphor to create the hyperreal sonic-image devised, i.e. '*Tidal Streams*', '*Tryst*', '*PLAY*' and '*Tempest in a Teacup*'.

Acknowledgments

First and foremost, I would like to thank my principal supervisor, Dr Paul Wilson, for his time, help, and friendship. I could not have wished for more support and I will be forever in awe of his enthusiasm, patience, and wisdom. Special thanks to Chris Corrigan and Craig Jackson for all of their help and technical support, Pearl Young and Marian Hannah for administrative support, everyone involved in the 'Spatial Audio Group' at SARC (Dr Gary Kendall and Dr Eric Lyon), and Professor Michael Alcorn for all of the advice and guidance. Moreover, this portfolio would never have been able to happen without the studentship (i.e. maintenance grant) awarded by the Department of Employment and Learning Northern Ireland (DELNI). I will be forever grateful for this opportunity - thank you.

On a personal note, I would like to thank Llinos Griffiths, my girlfriend, for putting up with me throughout this time - Diolch Cariad. Similarly, my family, Judith, Nigel, and Lucy Bird, for their continued support and encouragement towards my musical tendencies. I would also like to acknowledge and thank anyone that has helped me through this testing time. Every single person I have encountered along this wonderful journey has probably unwittingly contributed to this Ph.D. portfolio in some small way - Diolch yn fawr iawn!

... A diolch i chi am ddarllen fy thesis.

Contents

Storage Device Contents

Work	Folder Contents	Additional Material
1. *'Tidal Streams'*	Tidal_Streams_Read_Me.rtf Tidal_Streams.wav	
2. *'Thoroughfares'*	Thoroughfares_Read_Me.wav Thoroughfares_Interleaved.wav	Thoroughfares_Stereo1-2.wav Thoroughfares_Stereo3-4.wav Thoroughfares_Stereo5-6.wav Thoroughfares_Stereo7-8.wav
3. *'Tempest in a Teacup'*	Tempest_in_a_Teacup_Read_Me.wav Tempest_in_a_Teacup_Interleaved.wav	Tempest_in_a_Teacup_Stereo1-2.wav Tempest_in_a_Teacup_Stereo3-4.wav Tempest_in_a_Teacup_Stereo5-6.wav Tempest_in_a_Teacup_Stereo7-8.wav
4. *'Vivified'*	Vivified_Read_Me.wav Vivified_Interleaved.wav	Vivified_Stereo1-2.wav Vivified_Stereo3-4.wav Vivified_Stereo5-6.wav Vivified_Stereo7-8.wav
5. *'Everyday Mimesis; Grey Day'*	Everyday_MimesisGrey_Day_Read_Me.wav Everyday_MimesisGrey_Day_Interleaved.wav	EverydayMimesisGreyDay_Stereo1-2.wav EverydayMimesisGreyDay_Stereo3-4.wav EverydayMimesisGreyDay_Stereo5-6.wav EverydayMimesisGreyDay_Stereo7-8.wav
6. *'Tacet'*	Tacet_Read_Me.rtf Tacet.pd	
7. *'Empire Drive'*	Empire_Drive_Me.rtf Empire_Drive.wav	
8. *'PLAY'*	PLAY_Read_Me.rtf PLAY.mov	PLAY_Dance2.wav PLAY_Piano1.wav PLAY_Piano2.wav PLAY_Piano3.wav PLAY_Piano4.wav
9. *'Tryst'*	Tryst_Read_Me.rtf Tryst_Edited_Performance.mov	Tryst_Audio_Recording.wav Tryst_Performance_Static_Camera.mov Tryst_Installation_Read_Me.rtf Tryst.pd cordal.aif cordal2.aif drone.aif droneend.aif hit1.aif hitski2.aif reverb.pd SECTION2DELAY.aif SECTIONTHREE.aif

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Chronological List of Works

'Tidal Streams'

Duration: 10.00 Format: Stereophonic Date of Completion: March, 2009

'Tryst'

Duration: 15.16 Format: Quadrophonic Date of Completion: June, 2009

'PLAY'

Duration: 13.32 Format: Stereophonic Date of Completion: Dec, 2009

'Everyday Mimesis; Grey Day'

Duration: 5.34 Format: Octophonic Date of Completion: Aug, 2010

'Vivified'

Duration: 7.00 Format: Octophonic Date of Completion: Nov, 2010

'Tempest in a Teacup'

Duration: 11.46 Format: Octophonic Date of Completion: Feb, 2011

'Thoroughfares'

Duration: 9.45 Format: Octophonic Date of Completion: July, 2011

'Tacet'

Duration: 2.50 - 10.00 Format: Monophonic (+) Date of Completion: Jan, 2012

'Empire Drive'

Duration: 48.00 Format: Stereophonic Date of Completion: June, 2012

Chapter One

1.1. Introduction

Sometimes, listening to an audio recording that portrays an organised representation of an environment, sounding object or event can create a better listening experience than a physical encounter. It is easy to recognise that the listening experience encountered in a particular location is a dynamic and stimulating event, because all of the human senses maybe affected by the physical experience. The listener can also adapt to the causality of the environment sound in real-time, through selective hearing and changing the listening position or vantage point[3]. On the other hand, a recording (or an organised sound field) is not imbued with these kinds of attributes. Recorded sound does not stimulate all of the human senses, and, as a result, the listening experience can be much less dynamic, because of the fixed (or composed) perspective [4].

In a rather poetic way, this comparison was highlighted to me by the idea of the waterfall effect, first introduced by Eric Lyon[5], (N.B. this text has been paraphrased), "if one were to stand behind a waterfall and listen there would be all kinds of exciting psychoacoustic effects happening, all at the same time. The reflections of the sound waves would be bouncing off the cave or rock behind listener. The listener also has the option of moving their head to explore, adapt to and uncover the best possible listening perspective. The environment is also constantly changing due to the rapidly moving water, and that's not even touching on or including the physical aspects of the water vapour touching the listener's skin. In comparison, a stereo recording of the environment would be captured from a fixed position. There would be fewer psychoacoustic anomalies, and the static

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[3] In the context of the body of work, this idea has been explored through '*Tryst*'and '*PLAY*', as both works attempt to create a voyeuristic experience through merging the sonic and visual domains to create an experience.

[4] "Listeners to a concert adopt an almost ritualistic physical posture—seated with their ears in an effectively fixed position, muting other channels of sensory stimulation by remaining still and perhaps closing their eyes". Patton, J. 'Enhancing the experience of soundscape through psychotropic sound design'.
Available at: <http://www.resonantdesigns.com/proceedings/papers/jPatton.pdf>.

[5] Eric Lyon, Spatial Audio Group, Sonic Arts Research Center at Queen's University, Belfast, Nov 2011.

position of the microphone would not allow for real-time adaptation. Therefore, it is impossible to replicate the listening experience behind a waterfall through a recording alone".

Even though listening to a recording can be less of a dynamic and multi-sensory experience, there are a number of interesting characteristics that arise from this listening process. The microphone can create a neutral representation of any sound or sound field, negating the selective (or adaptive) nature of the human hearing system. In a similar vein, the common practice of listening to recordings in isolation (e.g. the recording studio), removes the physicality of the environmental listening experience and, provides more opportunity for one's attention to be directed towards the act of listening alone[6]. Furthermore, the microphone can explore positions or locations that the ears cannot[7], uncovering sonic perspectives that we would otherwise find impossible to encounter[8]. Similarly, during the act of recording, sound can be captured from multiple perspectives, enabling access to different vantages points that can be presented simultaneously to the listener (this is formally known as multitrack recording, which can create enhanced representations or accounts of sounds or events[9]). Finally, in organising recorded material (in studio-based environments), sound can be articulated, controlled and developed through digital signal processing and sound refinement

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[6] According to Moylan we do not only hear recordings as perceived performances, we also imagine that all sound sources exist within a shared performance space, that is, a *sound stage* within which sound sources are located, Moylan, W, 'The Art of Recording: Understanding and Crafting the Mix'. London. Focal Press, 2002.

[7] The immediate example that comes to mind is Chris Watson's 'Outside of the Circle of Fire' where two omnidirectional microphones are places inside the carcass of a Zebra capturing the sound of feeding Vultures.
More information available at: <http://www.chriswatson.net/discography.html>.

[8] This idea was explored through the portfolio of work, as '*Tempest in a Teapot*' explores utilising the sound of ice through custom-built hydrophones that were frozen and defrosted in water.

[9] For example, a string quartet recording can be carried out in a multitude of configurations, depending on the situation (i.e. The acoustic of the recording space, the ensemble/instrumentation and the desired sound-field). Microphones can be strategically positioned to capture all of the instruments at their optimum, from multiple perspectives (i.e. through ambient techniques which capture acoustic fingerprints and close microphone techniques which creates a non-reverberant impression). The subsequent production (or mixing) of the recording session may involve juxtaposing the separate channels to create an extremely detailed account or representation of the string quartet performance.

processes[10]. Moreover, particular features or characteristics of the sound field can be accentuated or manipulated.

All of the phonographic characteristics can become a subsequent focus of the (recording or composition) process, because unique representations or sonic-images can be created through sonic and structural organisation in a plethora of configurations; for clarification, the use of the terminology phonography refers to the process of field recording[11], i.e. the recording process associated with real-world sounds or objects in a specific place, on location or out 'in the field'. Reliant on the composer's musical objectives, the organisation and treatment of a phonographic recording can unfold in a number of ways, e.g. historical reference or documentation, as a sound effect engaged with another medium or even the basis for a kind of musical language. In this respect, the recording studio can be viewed as a highly complex musical instrument which allows the user to articulate and control any kind of recorded sound. In the context of the compositional approaches investigated in the portfolio, inspiration for the musical direction and the contexts explored has been taken from a range of stimuli. The everyday soundscape[12], natural processes[13] and devised narratives[14] influenced the musical investigation for the most part. In this vein, the compositional investigation relied not only on phonography and articulating sound in studio based

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[10] For example, through using digital technology recorded sound can be enhanced (in post production) allowing certain aspects or characteristics of the sound field to be accentuated or highlighted e.g. parts of the frequency spectrum can be altered or enhanced by equalisation and filtering processes.

[11] This definition is taken from the Electroacoustic Resource Site: "A global appellation for any musical or sonic work whose existence is dependent on the techniques of sound recording (at some point) in its creation. The term could therefore include many areas of electroacoustic music-making that involve the creation of a 'fiction' or 'fabrication' (e.g. acousmatic, anecdotal, plunderphonics, or collage-based compositions), but could also be extended to the customary use of sound recording (i.e. to document performances of existing musics) as well". Available at: <http://www.ears.dmu.ac.uk/spip.php?rubrique145>.

[12] i.e. '*Everyday Mimesis, Grey Day*', '*Vivified*' and '*Empire Drive*'.

[13] i.e. '*Tidal Streams*' and '*Everyday Mimesis, Grey Day*'.

[14] i.e. '*Tryst*', '*PLAY*', '*Thoroughfares*' and '*Tempest in a Teacup*'.

environments, but drew upon knowledge[15] and experience[16] that derived from listening, recording and finding musical materials in environmental sounds.

Over the course of the research, a phonographic approach guided most of the musical investigation and this can be traced clearly through the works in the portfolio. At the outset, the initial focus was generating sound worlds built from abstract materials or sound-fields (e.g. '*Tidal Streams*', '*Tryst*', '*PLAY*'). In the realisation of these works, environmental sounds, disembodied[17] (or isolated) from their origins, were grafted onto narrative-, idea- or metaphor-based structure. Even though the initial recording process was integral to forming the works, the unique characteristics derived from the phonographic process (e.g. the time of recording, the surrounding environment and sense of place) were not being exploited to their full potential. For the most part, the sounds and strategies ignored the (original) characteristics afforded through the process, simply focusing on capturing a particular sound in a point source fashion, so that it could be sonically and temporally scripted into an organised sound world. The initial focus on context-driven discourse gave way to organisational processes that sought to create spatially dynamic octophonic sonic-images through the phonographic process (e.g. '*Everyday Mimesis; Grey Day*', '*Vivified*', '*Empire Drive*', '*Thoroughfares*'). In each instance of these works the investigation focused on exploiting the unique characteristics that arose from framing a particular time, place and space; it should be noted that to some extent, even when the recording process was a focus, contextual frames and boundaries will still be highly relevant to the work, as considering the surrounding information will provide a better insight into the sonic-image portrayed (e.g. knowledge of the happenings in Northern Ireland

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[15] I agree with Denis Smalley's view that "It is not a scientific knowledge which is required but an experiential knowledge" Smalley, D. 'Spectromorphology', The Language of Electroacoustic Music, Macmillan, 1987, pp81.

[16] For Denis Smalley "the compositional process is a type of journey of discovery; he begins by experimenting with different sounds he has collected, discarding some and keeping others which are then further treated. The form and shape of the piece subsequently grows out organically from what is suggested by the sounds themselves" - Smalley, D. 'Vortex Notes', by Cox, C.
Available at: <http://www.music.columbia.edu/masterpieces/notes/smalley/more.html>.

[17] The dis-embodied and dis-placed sounds have the potential to create acousmatic situations in which listeners, denied the visual cues that would verify the source of the sounds they hear, actively seek to identify the sound's source and place through imaginative aural inference. Sun-Jun, K. 'Imaginal Listening: A Quaternary Framework for Listening to Electroacoustic Music and Phenomena of Sound-Images', Organised Sound, Volume 15, Issue 1, 2010.

around the 12th of July will allow for a better contextual understanding of the soundscape in '*Empire Drive*' and '*Vivified*'). During this investigation, novel phonographic and spatialisation methodologies for generating octophonic sound-fields were established. This approach culminated in '*Tacet*', which uses the idea of framing the sound of a place (and time) during performance; i.e. infrasound is used to frame the sound of a concert hall in real-time as the audience enters the performance space before the programme begins.

In the following chapters, the thematic structuring of the commentaries attempts to reflect the growing influence of phonography in the investigation; Chapter Two relates to the works that rely heavily on the phonographic process and Chapter Three discussed the works that depend on contextual boundaries and metaphor to create the hyperreal sonic-images.

1.2. Context

In spending a number of years listening to electroacoustic music, the presence and use of recognisable sound(s), suggestible scenarios and real-world references in organised sound-worlds has always intrigued and fascinated me. The ambition and motivation for investigating this kind of compositional resource stems from this interest, foremost led by a personal desire to better understand the application of phonographic, referential or semiological sound in organised sound worlds. It seems almost trivial to try and suggest that this theme, the music presented and the following insights are completely original, as my knowledge and outlook has been influenced by much of the existing repertoire and research around the field. The discernibility of the sound sources or objects and the subsequent imagery has always been a common point of deliberation within the field of electroacoustic music[18], since the beginnings of Music Concrete with Pierre Schaffer and the sound object, to more recent development or branches[19] of the broad spectrum of what is now generally defined under the umbrella term, electroacoustic music. Research, music and work related to the electroacoustic sphere has been influential in the development of the portfolio, because it has broadened my knowledge of the field. Discussing the language of organised sound can become complex when using associated terminology, so through the written commentaries there has been a strong intention to avoid using such vocabulary; it seems almost irrelevant to discuss the sound worlds, environmental sound or the soundscapes explored with complex terminology, as this type of sound world already articulates and communicates, all by itself. In the context of the compositional investigation, the body of work has, for the most part, been developed in the practical realm, so devising and relating to existing theory, frameworks or terminology was never within the bounds of the investigation.

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[18] For example, Simon Emmerson has written extensively around this subject and notably describes the abstract aspects of electroacoustic music interacting with mental images: "By deliberately removing the visual clues as to the cause of the sounds, indeed by removing or reducing visual stimulation of any kind, the composer is almost challenging the listener to re-create, if not an apparent cause, then at least an associated image to 'accompany' the music". Emmerson, S. Macmillan, 1986.

[19] like soundscape composition coined by R. Murray Schafer, Schafer, R. M. 'The Soundscape, Our Sonic Environment and the Tuning of the World', Knopf, 1977.

Even though the creative practice did not set out to relate directly to the research of Denis Smalley and Simon Emmerson, it is important to note the significant influence of their theoretical contributions on the creative process. In the seminal publication 'Spectromorphology: explaining sound shapes', Denis Smalley attempts to "make collective sense of a wide range of individual electroacoustic musics created since the birth of the medium[20]" through the spectromorphology framework. The framework examines a number of processes relating to the acousmatic domain (i.e. defining structural relations and behaviour (e.g. listening approaches) experienced in the termporal flux of the music which enables musical experiences to be better articulated and understood[21]. In this vein, 'Source bonding' can be used to describe "a natural tendency to relate sounds to supposed sources and causes, and to relate sounds to each other because they appear to have shared or associated origins[22]". In experiencing a source-bonded sound, Smalley describes, "the listener intuitively attempts to relate sounds to their real or imagined sources, making use of his or her previous experiences and cultural conditioning regarding the make up of the sonic world[23]". During the compositional investigation, in attempting to make the most convincing musical experiences, source-bonded sound worlds became the most viable platform to explore. Perceptual experience and personal preference inevitably played a large role in defining this pathway, and as Smalley concludes, "Discovering and defining the natural link is important for the composer-listener communication because new musical 'languages' (if such a thing is really possible) or significant shifts in language are not created in a vacuum, but must have some shared natural-cultural basis if they are to make sense to listeners[24]". In many respects, all of the presented works can be described as being source-bonded, for example, '*Tidal streams*' uses the context of a metaphoric sonic journey that unfolds underwater, '*Everyday Mimesis; Grey Day*' directly references Belfast through the

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[20] Smalley, D, Spectromorphology: explaining sound-shapes, Organised Sound, Vol 2, Issue 2, 1997, pg 125.

[21] Paraphrased sentence, Smalley, D, Spectromorphology: explaining sound-shapes, Organised Sound, Vol 2, Issue 2, 1997, pg 125.

[22] Smalley, D, Defining Timbre, Refining Timbre, Contemporary Music Review Vol 10, Issue 2.

[23] Smalley, D, Defining Timbre, Refining Timbre, Contemporary Music Review Vol 10, Issue 2.

[24] Smalley, D, Spectromorphology: explaining sound-shapes, Organised Sound, Vol 2, Issue 2, 1997, pg 107.

source recordings and the (colloquial) title, and '*Thoroughfares*' uses the idea of a thoroughfare to frame the constructed sonic journey through the City. However, the sound field investigated in '*Tempest in a Teacup*' probably provides the most extended example of a source-bonded sonic environment because the work is formed from a set of recordings that capture the natural process of water freezing and melting. Moreover, in the context of Smalley's view expressed in 'Space-Form and the Acousmatic Image[25]', 'Space-Form' investigates the experiential process of humans understanding their sonic environment. Space-form and the Acousmatic image develops the spectromorphological framework, now including spatiality as a pivotal aspect of the acousmatic composition process. In the context of the portfolio, it was only through investigating recording methodologies and working with acoustic environments that dealing with space became a recurrent theme in the creative works. As phonographic processes dominated the musical investigation, different spaces and spatial configurations explored a variety of environmental sound fields and perspectives through complex microphone arrays. In many ways, the portfolio of music became my own attempt to provide a series of works that are based around spatial configurations (or space-forms) afforded through the phonographic process.

Correspondingly, the notion of focussing on representation and impression through recognisable and unrecognisable recorded sounds emerged as a recurrent theme through the creative work. Reviewing the development of the creative practice, it is clear to see that there was a shift in focus from using metaphoric and abstract representation through contextual frameworks, to using highly recognisable phonographic sound fields built from (extended) phonographic processes. Simon Emmerson's notion of the mimetic-aural continuum[26] highlighted the versatility of the musical languages created from recorded sound and this influenced the shift in focus of my musical investigations. As Emmerson describes mimetic discourse - at one end of the aural-mimetic

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[25] Smalley, D. 'Space-Form and the Acousmatic Image', Organised sound, Volume 12, Issue 01, April 2007, pp 35-58. Availible at: <http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=971860>.

[26] Emmerson, S. 'The Language of Electroacoustic Music', Macmillan, 1986.

continuum, which can be used to effectively construct and organise sonic landscapes with recognisable characteristics, allowing narratives or compositional themes to be formed and projected through the recognisability of the sonic landscape. At this end of the continuum (mimetic), sound can be used unchanged or naturally, as a means of presenting a scenic picture or an impression of reality. Here, transformation and manipulation of sound objects can be subtle or limited, becoming more focused on structural sequencing and aiming to enhance certain qualities contained within the recording i.e spatial information, sounding events, particular frequencies or the whole scenic impression. At the other end of the continuum, Simon Emmerson describes aural discourse, where the sound object "remains relatively free of any directly evoked image[27]". Generally speaking, sound can manifest with a high level of digital signal processing, which can result in blurred representations of the original sound object or recording, making the source or origins of the source material no longer recognisable or familiar, and more abstract in its representation and signification properties. In the context of the compositional work, the exploration focused primarily on aural characteristics, using a contextual setting, abstraction and metaphor to generate hyperreal sonic environments, but as the influence and application of phonography developed, the sound worlds shifted towards exploring mimetic characteristics, providing clearly recognisable scenes and scenarios that would be immediately understood by the majority of listeners. This development was not necessarily planned, and did not take immediate influence from the mimetic-aural continuum by trying to create mimetic or aurally weighted works. Rather, this derived from experimenting with phonographic practices, focused on creating realistic, acoustically or spatially dynamic octophonic sound fields that would create (the most believable) immersive sonic environments. The source recording was imbued with acoustically complex sound fields that would be almost impossible to replicate through synthesis (or DSP). In some respects,

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[27] "It should also be noted that "the use of the term 'continuum' does not necessarily impel linearity; while there are obvious advantages in representing some of the dimensions as linear, there are instances where analogies to nonlinear space are more appropriate." Emmerson, S. 'The Relation of Language to Materials', The language of electroacoustic music, Macmillan, 1986, pp 18.

mimetic sound worlds prevailed because they engendered the most convincing environmental impressions.

Perhaps the most relevant context for the body of music may be that of the (subsequent) 'Soundscape Composition' approach[28], as environmental sound or what has previously been defined by R. Murry Schafer as 'the soundscape' featured prominently through the practical work. Taking inspiration from Hildegard Westerkamp[29], I have discovered that a focus on the Soundscape can create sonic languages that stimulate and excite my creative practice. However, it can be somewhat bewildering to try and summarise the body of work now associated with the term 'Soundscape', as there are so many relevant (and perhaps even irrelevant) strands of music and research[30] (particularly in context of the body of work presented). The term soundscape[31] seems quite broad, and some practitioners even appear to be concerned with all aspects of the soundscape. For the most part, this involves a wide spectrum of disciplines and practices[32], including soundscape design, soundscape composition and aspects of (soundscape or) acoustic ecology. The main distinction between the musical investigation and soundscape composition, in general, is the ecological and pedagogy focus[33]. This characteristic is discussed by Barry Truax in 'The Principals of Soundscape Composition', (i.e. "The work enhances our understanding of the world and its influence carries

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[28] R. Murry Schafer, Barry Truax and Hildegarde Westerkamp et al.

[29] "The term soundscape composition did not exist when I started composing with environmental sounds in the mid-seventies. Through a variety of fortunate circumstances and because of what the seventies were in Vancouver and Canada-artistically inspiring and moneys were available for adventurous and culturally, socially, politically progressive projects-I had discovered that environmental sounds were the perfect compositional "language" for me", Westerkamp, H. 'Linking Soundscape Composition with Acoustic Acology', Organised Sound, Volume 7, Number 1, 2002.
Available at: <http://www.sfu.ca/~westerka/writings%20page/articles%20pages/linking.html>.

[30] Kathrine Norman has commented around this point, "Definitions of 'soundscape' are somewhat hard to pin down, and there sometimes seems little consensus as to what exactly the word is intended to convey, or the field of study to encompass", Norman, K. 'Editorial', Organised Sound, Volume 16, Issue 03, December 2011, pg 203 - 205.

[31] Particularly; Schafer, R. M, The Soundscape, Our Sonic Environment and the Tuning of the World, Knopf, 1977 and Truax, B, The Handbook for Acoustic Ecology, Originally published by the World Soundscape Project, Simon Fraser University, ARC Publications, 1978. (Please *see the Bibliography for further Soundscape references).*

[32] As Barry Truax describes, "all soundscape studies have been the concern of the World Soundscape Project" Truax, B. 1999. Furthermore, "The study of the systematic relationships between humans and sonic environments is called soundscape or acoustic ecology, whereas the creation, improvement or modelling of any such environment is a matter of soundscape design. All aspects of soundscape studies have been the concern of the World Soundscape Project." Truax, B. 1999.

[33] e.g. in a similar fashion 'Kits Beach Soundwalk by Hildegarde Westerkamp.

over into everyday[34]"). The investigation centered on the practicalities involved in the compositional process and, it is safe to say that within my musical vocabulary, there is no desire to place preconceptions on listeners. The phonographic sound, accentuating the hyperreal, is primarily viewed as being disembodied[35] from its origins or the ecology of the original environment from which it was taken from[36]. Therefore, the composed environments are not considered as being a factual representations of the environment explored with a microphone. The artistic treatment (and rendering) of the sonic material produces a completely new environment, detached from its origins, that requires performance to bring the work[37] to life. Even though the compositions exist in a physical sense, that is in some format or other (on a hard drive or on paper), they will only be brought to life during the act of listening by the listeners perception and subsequent interpretation of the hyperreal work. In the best case or scenario, the body of music should simply be listened to, experienced and (hopefully) appreciated. In many respects, listening to soundscape composition[38] (and electroacoustic music in general) is much like the process of watching a film in the cinema. Ultimately, in this field, one may deal with and engage in a fantastic kind of reality that may articulate a narrative, thematic setting and context, however, for the majority of the audience the

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[34] i.e. the principals of soundscape composition discussed by Barry Truax. Truax, B. 'Soundscape Composition', Simon Fraser University. Available at: <http://www.sfu.ca/~truax/scomp.html>.

[35] Sound recording plays a central role in acousmatic art making. The act dislocates sound from its physical origin in space and time, allowing one to contemplate the meaning of the data carried and the aesthetic elements of the fixed and unresponsive recorded event. When related to sound, a dictionary definition of disembodiment may act as an adequate departure point for an understanding of the acousmatic listening condition. That is, 1. separated from or existing without the body, 2. (of a sound) lacking any obvious physical source. Through the act of dislocation, the once ephemeral nature of a sound is separated from its visible source-cause and established as a repeatable and manipulable sound-object in itself. Rylands, D. 'Concrete Abstractions: Reflections on Sound Recording for Immersive Acousmatic Composition', Electroacoustic Music Studies Network. Available at: <http://www.ems-network.org/ems09/papers/rylands.pdf>.

[36] As Francisco Lopez explains, "I don't think that 'reality' is being reproduced with these techniques; rather, a hyperreality is being constructed. The carefully recorded, selected, and edited sound environments that we are able to comfortably enjoy from our favorite armchairs offer an enhanced listening experience, one that we would likely not have if we were listening in the 'real' world." Lopez, F. 'Schizophonia vs. l'objet sonore, Soundscapes and Artistic Freedom', Sonus, Canadian Electroacoustic Community, 1998.

[37] It could be argued that the sonic landscapes can only come to life and exist in the minds eye of the listener, during the act of listening; this sentiment is echoed by the philosophical thought argument initiated by Bishop George Berkeley "if a tree falls in a forest and no one is around to hear it, does it make a sound?", Bishop George Berkeley, (1605 - 1753), Scott, Foresman and Co, 1910, pg 235.

[38] With reference to the fourth soundscape composition principal, "...and its influence carries over into everyday perceptual habits", the principals of soundscape composition, Barry Truax Truax, B. "Soundscape Composition", Simon Fraser University. Available at: <http://www.sfu.ca/~truax/scomp.html>.

experience concludes once the film is over. Some of the audience (e.g. cult followers) may take the experience or parts of the film into the everyday, but the majority of people will not[39].

Over the course of the research, whilst practical experience with phonographic processes developed through the creative work, phonographic practice was informed by a range of different work and research[40]. Chris Watson[41], who is widely known as being one of the world's leading experts in recording wildlife and natural phenomena[42], provided some of the most useful ideas for the phonographic approach. During the act of field recording, Watson suggests considering three levels of sound focus, atmosphere, habitat and focused sound. Firstly, 'Atmosphere' is a background recording that is usually quite long in duration. This kind of recording is made with a high signal-to-noise ratio (set on the recording equipment), and its playback in post-production (over loudspeakers) should be set at the same level as it would be heard in the natural environment. The dynamic range of an atmosphere's sound field is generally quite limited, so the selection of a recording location (including the surrounding acoustic) is highly important in this approach. Recording ambient atmospheres can uncover quite a bit of sonic information that is not necessarily audible in the environment, e.g. in recording a forrest or woods there maybe unwanted sounds uncovered from a nearby road or planes passing overhead. Time should be dedicated to the setup of the recording process, as creating a good sound field with the microphone will negate having to alter it too much in post-production. Secondly, 'Habitat' recordings contain more dynamic sound,

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[39] "Acousmatic music is ideally suited for this purpose: to create mental imagery through sound, one of the reasons it is also referred to as 'cinema for the ear'. However, it accesses a constructive process more similar to literature based in individual imagination: the author describes characters and situations through words, but it is the reader who supplies the final mental image". Rudy, P. 'Timbral praxis: when a tree falls in the forest is it music?', Organised Sound, Volume 12, Issue 01, 2007.

[40] Although the focus of this work may not be directly related to phonography, it was very useful for considering and contemplating the process: 'The Recording Angel: Music, Records and Culture from Aristotle to Zappa', Evan Eisenberg, Yale University Press, 2005. . Phonography, Repetition and Spontaneity, Lee Brown, Philosophy and Litrature, Vol 24 No 1, April 2000. 'The Art of Recording and the Aesthetics of Perfection', British Journal of Aesthetics, Vol 43 Issue 4, pg 345-262. 'The Producer as Composer: Spaping the Sounds of Popular Music', Virgil Moorefield, MIT Press, Feb 2010. '100 Years of Phonography', H-W Steinhausen, JAES Vol 25, Issue 10/11, pp 896-897, Nov 1977. 'Defining Phonography; An Experiment in Theory', Eric W. Rothenbuhler and John Durham Peters, Music Quarterly, Vol 81 Issue 2 pg 242-243.

[41] A Talk with Chris Watson, Ulster Festival, University of Ulster, Art College, June 2010.

[42] For more information please see <www.chriswatson.net>.

which can be auditioned with a louder amplitude in the studio. This process generally involves close microphone techniques which directly target specific sounds or events. An example of this is '*Vultures eating a bird carcass*'[43], recorded by Watson from inside the carcass with a small quad array of omni-mics, attempting to capture the haunting vulture squarks and violent pecking sounds. Finally, a 'Focused Sound' approach involves recordings of sounds that have been sequenced and mixed in post-production to create a contrived reality, generally used by Watson to create a aural backdrop to picture-based events e.g. crashing waves, dialogue, gunshots and discrete sounds from the animal kingdom. In context, this may involve a close-mic'ed recording of a hissing cockroach superimposed on top of an expected natural habitat or atmosphere, giving the illusion that all sounds exist convincingly in the same place at the same time. Focused sounds are usually recorded in mono, whereas atmosphere and habitat recordings will tend to be stereo or quad-channel recordings. The technical focus of the recording approaches is very useful for exploring different microphone configurations and patterns. However, these strategies only really deal with the recording process, as 'Atmosphere', 'Habitat' and 'Focused' recordings maybe juxtaposed during the production process. Therefore, the production process can be considered as important as the source recording procedure, and as previously suggested, the subsequent treatment of a phonographic sound-field is ultimately dependent on the intentions of the engineer or phonographer.

The focus of the creative work, generating and highlighting unique compositional processes, takes inspiration from a number of key practitioners in the field. Both Francisco Lopez and Bill Fontana's work focuses on exploring compositional methodologies that rely heavily on the phonographic process. Francisco Lopez's sonic art[44] mainly manifests through utilising processes related to phonography. Lopez views each performance of his work as being site specific, with each performance space being adapted through organising the speaker configuration and real-time sound

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[43] The example provided during the talk: Vultures, Outside the Circle of Fire, Track 12, Chris Watson, Touch, 1998.

[44] Available at: <http://www.franciscolopez.net/disc.html>.

diffusion. Furthermore, Lopez has attempted to enhance the acousmatic listening experience by blindfolding audience members, and seating them in a circular formation around the mixing desk[45] facing towards the loudspeakers; the speaker configuration is usually a minimum of a quadrophonic array, generally positioned in the corners of the performance space. This listening experience is very different to what has become traditional in electroacoustic presentation, which is more often than not, seated in rows, placed from the front to the back of the space, generally somewhere inside of the sound field projected by the speaker array. This presentation methodology may go some way to addressing the issues with maximizing the stereophonic sweet spot for large audiences. Moreover, this arrangement avoids the audience members seeing someone sitting at the mixing desk, which can be distracting during the acousmatic experience (probably another reason for using this arrangement). In surveying Lopez's catalogue of works, it is clear that the listening experience is paramount, and these extra-musical processes go some way to enhance the acousmatic experience. For example, Lopez has experimented with taking away the audiences visual senses before they even get to the performance space. In this scenario, audience members were split into small groups and told to meet at a particular point in the city. At the meeting point, audience members were blindfolded by a guide and driven to the performance space under acousmatic conditions. After the performance or programme finished, the audience members were then taken back to the same position from where they were picked up, extending the acousmatic nature of the concert experience with extra-musical processes ensuring they were not able to tell where (in the city) the performance took place. With this influence in mind, the experience created by the composed sonic-image is something that has been of primary concern during the investigation and as a result, there is a growing (personal) interest in this subject. The nature of the fixed medium composition, to repeatedly listen to the sound world as it is being composed, underpinned an experiential process that informed the creative process to an extent. Inevitably, this translated to the performance process, where the audience will be faced with listening, interpreting and imagining

[45] For more information please see: <http://www.franciscolopez.net/live.html>.

the devised sonic-image. In the context of the investigation, the different types of sonic-images propose contrasting types of listening experiences. '*Tryst*' allows for each performance space to be adapted through the positioning of the quadrophonic speaker array. In addition, the work is experienced by the audience in a standing position that attempts to emphasise the voyeuristic nature of the work, as the audience is forced into choosing a vantage point in the performance space. In contrast, '*Tacet*' exploits the idea of extending the listening experience through introducing infra sound gradually into the performance space as the audience enters the room. Moreover, through the investigation of compositional processes over an octophonic speaker array, the sequential spatialisation and multi-device recording approaches emerged[46]. In the context of the sequential spatialisation technique, at its most complex configuration, different recorded events (taken from different times) can be projected from each of the four stereo speaker pairs in the octophonic array. The minute time differences created by sitting in different positions in larger performance spaces can create slightly different versions of events. These characteristics become even more apparent in the multi-device recording methodology, which, for the most part, explored moving sources (i.e. Trains and Aeroplanes) to create a sense of the object (i.e. Train or Aeroplane) moving through the octophonic speaker array, without using complex spatialisation tools.

Another key aspect of Lopez's compositional work comes from the framing of time and place. Examples of this range from framing the naturalistic sound of the tropical rain forest in the Caribbean lowlands of Costa Rica (in 'La Selva', 1998) to the anthropomorphic sound of offices in New York ('Buildings [New York]', 2001). Lopez uses collage, for the most part, juxtaposing different times and locations seamlessly to form a sonic impression of a place. Sometimes these works can be considerably long in duration and in the act of listening, it is easy to become almost mesmerised by the sound world being played out; this kind of experience is reflected through the compositional work in '*Empire Drive*', which is forty-eight minutes in duration. Collage is a staple

[46] Please see section 1.3.1 & 1.3.2 for a broader discussion of these methodologies.

of the approaches applied in Lopez's work, evident from workshops where he systematically frame the sound of a place. In the context of the composition portfolio, through performing informal phonographic experiments, the process of framing a time and place was objectively explored. It took a considerable amount of time to identify a methodology for working creatively with phonographic sound, and there are, in fact, many areas where the composer can focus organisational patterns and structures (this will be discussed further in Chapter Two). The most pertinent examples of phonographic methodologies in the portfolio of works come from '*Everyday Mimesis; Grey Day*', '*Empire Drive*', '*Everyday Mimesis; Grey Day*' and '*Vivified*'.

Parallels with the work of Bill Fontana arise through utilising multi-channel (and multi-location) field recording methodologies. The idea of hearing the same sound event from different locations (or mapping the same sound) with multiple images became an area of focus as the creative investigation developed. In the words of Fontana, "To me sound is very physical, and it has a real sculptural dimension to it because if you take any sound that you are hearing and if you have done any work with recording sound, you realise that there's many choices you have about where you can put microphone, and if you have the ability to use more than one microphone to listen to a sound, you realise that a sound field is like this three dimensional thing kind of alive in a space, much like a person is a three dimensional thing alive in a space and from the very beginning I became very intrigued by sculptural dimensions"[47]. Multi-channel (and multi-location) phonography methodologies have been explored in a number of Fontana's works and, over time, the recording processes involved have become more elaborate and refined. For example, 'Through the Golden Gate' from 1987 juxtaposes live microphone feeds, thirty miles apart, from the Golden Gate bridge in San Fransisco and the Farollen Islands. This methodology simply juxtaposes the sound of two spaces, which are visibly connected but not usually linked through sound; there is no indication on how synchronous the real-time microphone feeds were in playback. The most current and

[47] Interview available at: <http://www.resoundings.org/Pages/Urban%20Sound%20Sculpture.html>.

effective multi-location recording methodology arises in the 'Speed of Time', which is a real-time sculptural sound map of Big Ben's chimes. This project involved creating multiple sound images (in real-time) from different vantage points around Big Ben[48], in an attempt to provide a detailed impression of the chimes, mechanisms and the surround environment. The sound was captured by an array of microphones that were placed at incremental distances from the clock tower, which Fontana describes as being "networks and live transmission systems". Fontana applies natural acoustic delays to the audio feeds to align the various impressions in playback at an isolated location, which involves measuring the distance of the (microphones) vantage point from the clock tower and dividing it by the speed of sound. As Fontana discusses, "Sound travels at a speed of about 11,000 feet per second so when you put these distances together at the same time you get a very musical version of Big Ben" [49]. Much like the sonic representation explored by Fontana in the Speed of Time, phonography was explored extensively to create elaborate sonic-images over the octophonic speaker array. Each phonographic methodology explored through the compositional work attempts to create a different kind of (multichannel) sonic-image from the recording process, in the octophonic speaker array. Through experimentation, a systematic methodology involving satellite controlled alarm clocks enabled different recording devices to be synchronised from different locations. This approach becomes particularly useful when recording sources at variable distances, with individual recording devices. '*The Speed of Time*' methodology becomes difficult to apply when multiple recording devices are being used in the field, because it is difficult to measure accurately the distance between the individual devices. In addition this is exacerbated when investigating the process across lager intervals and distances in terrain with obstacles. GPS coordination was explored, but the coverage with a network (e.g. 3G) was limited and unreliable. The investigation with multi-channel location recording revealed a novel methodology for recording sources at variable distances with multiple recording devices; this is outlined in further

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[48] Interview available at: <http://www.resoundings.org/Pages/Speeds_of_Time_new.html>.

[49] Interview available at: <http://echosounddesign.com/media/BBC_Hear_and_Now_on_Speeds_of_Time.mp3>.

detail in the following section. This elaborate process allows different listening positions to be synchronised, enabling unique multi-channel representations of sounds or sound fields to be devised in the octophonic speaker array.

1.3. Compositional Methodology

Even though the works are chronologically independent of one another, the musical procedures and methodologies nurture stylistic patterns that can be traced through the creative work. Links between the stylistic setting, the kind of source material explored and the recurring application of the established methodologies (i.e. sequential spatialisation and multi-device phonography[50]) can be traced throughout the creative work. As it is possible to see (and hear) common characteristics between the individual works, it is worth discussing some of the common links to avoid repetition. Digital signal processing techniques and object orientated and script based programming languages (i.e. pure data, Max MSP, CSound and Supercollider) were used to develop large proportions of the (abstracted) source material. Evidence of this is apparent in '*Tidal Streams*', '*Tryst*' and '*PLAY*', where abstracted phonographic sound and metaphoric representation is explored extensively, and through '*Tacet*', which explores infrasound subtly. In the manipulation and transformation of a sound object, DSP can be used to abstract musical materials and sonic-images to various degrees, either nurturing or obscuring recognisable features (or traits) in the sound object. Digital signal processing chains can allow for non-linear exploration of a recording or sound file, which can bring about a broad spectrum of sound (or source recording improvisations) derived from the original sound object or recording. In the early stages of creating a work, this can be used to stimulate further compositional investigations or even signal a change in the current musical discourse[51]. Several digital signal processes, for example, spectral delay[52], granular synthesis and spatialisation tools, featured prominently because they provided a technique for obscuring musical materials. This process can be used to enhance or accentuate particular frequencies (or develop tonality) contained within the source, developing an abstract (musical) version of the untransformed clean

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[50] Used in '*Everyday Mimesis; Grey Day*', '*Vivified*' and '*Thoroughfares*'.

[51] Denis Smalley has described a similar compositional process, "the compositional process is a type of journey of discovery; he begins by experimenting with different sounds he has collected, discarding some and keeping others which are then further treated. The form and shape of the piece subsequently grows out organically from what is suggested by the sounds themselves" Smalley, D. 'Vortex Notes', by Cox, C. Available at: <http://www.music.columbia.edu/masterpieces/notes/smalley/more.html>.

[52] Built around the CSound Tools for Real-time Spectral Processing.
Opcodes Available at: <http://www.csounds.com/manual/html/SpectralRealTime.html>.

source. In working with phonographic sound, and particularly environmental sound, spectral delay is very effective, because it can develop aspects of the sound world whilst sustaining a good impression of the original recording or space. In the following commentaries, the digital signal processing techniques will be outlined in each work. It is also important to note that the commercially available software, Reaper[53] (created by Cockos), was used as a digital audio workstation, and, Audition[54] (created by Adobe), was used for equalisation and mastering.

Another recurring characteristic developed from working with multi-channel speaker and microphone arrays. The investigation involved encoding spatialisation in (post) production and developing the spatial characteristics captured during the source recording process. Octophonic (or eight channel) speaker arrays have been called "the new stereo"[55], and, one can find a plethora tools and methodologies for multichannel sound spatialisation and manipulation[56]. A survey of the existing spatialisation tools revealed what strategies worked best with stereophonic source materials and this investigation revealed that spatialising (stereo-based recordings of) environmental sound becomes problematic when being spatially manipulated because the stereo format is already encoded with spatial information. Subsequent investigations focused on exploring extended stereo-based recording and spatialisation configurations, and explored a range of different sound fields with stereophonic foundations over the octophonic speaker array. The investigation culminated in the sequential spatialisation and multi-device procedures, and as these methodologies were actively applied in a number of the works. Detailed accounts of their application is outlined in the following sections to avoid repetition in the individual commentaries. Even though encoded spatialisation

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[53] More information available at: <http://www.cockos.com/reaper/>.

[54] More information available at: <http://www.adobe.com/uk/products/audition.html>.

[55] Stated by Eric Lyon, 'Eight channel is the new stereo', Wilson, S and Harrison, J. 'Rethinking the BEAST: Recent developments in multichannel composition at Birmingham Electroacoustic Sound Theatre'.
Available at: <http://scottwilson.ca/files/Rethinking%20the%20BEAST.pdf>.

[56] e.g. Pulkki, V. 'Vector Base Amplitude Panning', further information available at: <http://www.acoustics.hut.fi/research/cat/vbap/>, and 'Sound in Space', The University of York, Ambisonics and related 3-D audio research further information available at: <http://www.york.ac.uk/inst/mustech/3d_audio/welcome.html>.

processing (i.e. Vector Based Panning) has been used to develop musical ideas in '*Tempest in a Teacup*', to spatially manipulate and enliven the monophonic recordings, careful consideration was given to musical issues rather than nurture technological listening[57]. Generally, in the context of the approaches explored, if more detailed spatial manipulation is employed, it is always accompanied by a wider spatial image or perspective, and this is usually developed (or masked) by a stereo source.

1.3.1. Sequential Spatialisation

Through experimenting with spatialising stereophonic field recordings[58] in octophonic speaker arrays, a systematic methodology was developed and established to create animated representations of the (stereo) source recording. This process involved projecting up to four different periods of time taken from the same stereo recording and diffusing them over the four separate stereo speaker pairs in the octophonic array. The level focus from the projected sonic environment (in the octophonic speaker array) is dependent upon how many speaker pairs are projecting the same stereo source. For example, if the same stereo image is being projected by all four speaker pairs (shown in 'Figure. 1' below), the representation of the recording is evenly spread across the octophonic array, creating a limited acoustic or spatial impression. This sonic impression gained through this approach can be made more dynamic through layering stereo impressions taken from the same recording, in the different stereo speaker pairs. Whilst making the overall spatial-image more dynamic, this process also condenses and diffuses the representation of time, as different time periods taken from the same recording are sonically and temporally juxtaposed. For example, a ten

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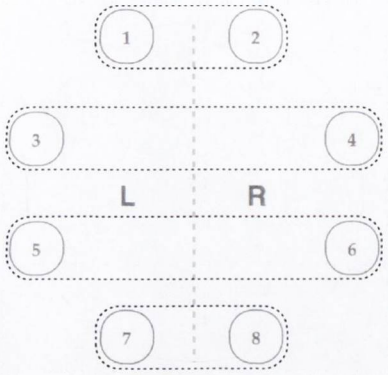
[57] Denis Smalley coins the term 'Technological Listening', which describes a listening mode amongst those with expertise in electroacoustic techniques. Technological listening occurs when a listener 'percieces the technology or technique behind the music rather than the music itself, perhaps to such an extent that true musical meaning is blocked. Smalley, D. 'Spectromorphology: Explaining Sound-shapes', Organised Sound Vol. 2, No. 2, Cambridge: Cambridge University Press.

[58] What is more widely known as field recording - the following definition is more of an encompassing description, involving any music created by phonographic sound "Any sound recording created away from the studio in a specific space or sonic environment. The aim of field recording might be to capture a particular element of this space (as is the case, for example in documentary nature recordings), or to capture the totality which may be thought of as soundscape, auditory scene, or ambience". Available at: <http://www.ears.dmu.ac.uk/spip.php?rubrique1382>.

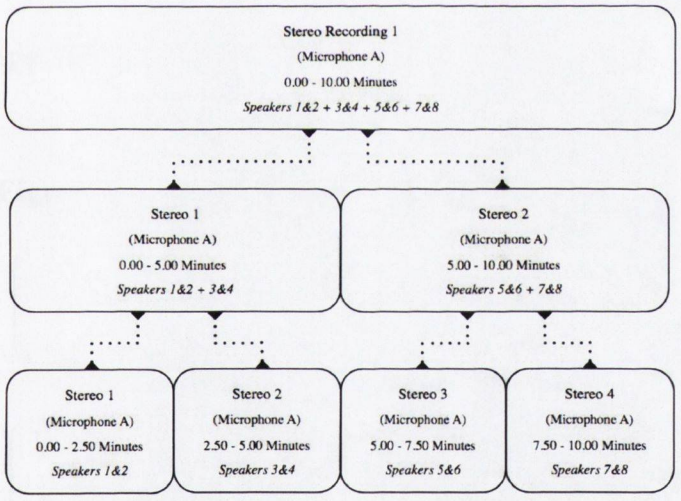
minute recording can be split into (two) five minute sections e.g. Speakers 1&2 + 3&4 project 0.00' - 5.00' and speakers 5&6 + 7&8 project 5.00' - 10.00' (please see 'Figure. 2').

Figure 1. Stereo Pairs in the Octophonic Speaker Array



The numbers outlined in the figure indicate the speaker or channel number and the dotted lines outline the four stereo speaker pairs. Due to working with stereophonic source material, it was logical to use an octophonic[59] speaker array in four stereo pairs, rather than 8 speakers spaced on a circle by 45° (with the first speaker at 0°). This allowed the stereophonic images to be exploited systematically. There are of course other configurations where there stereo field can be linked between speakers in this array, for example from front to back (e.g. speaker 1-L, speaker 7-R), however, the most common approach in the compositional methodologies performed are highlighted in the diagram.

Figure 2. Sequential Octophonic Spatialisation using a Stereophonic Recording



The flowchart attempts to represent the process of time-condensing and spatialising a stereo soundscape recording which can create an octophonic representation of a stereophonic image. This novel process does not create an accurate spatial representation (or a factual account) of the recorded environment because it condenses the duration of the recording. It simply allows for a spatially animated stereo-octophonic image.

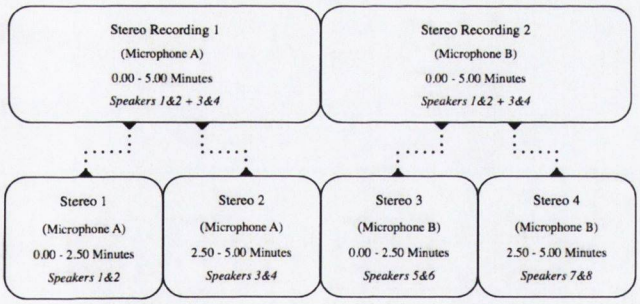
In using these editing and the enhancement processes during production, natural gestures and embellishments taken from the same recording are superimposed to generate a coherent and convincing sound field. Rather than creating a patch or script which could perform simplified edits (as outlined in the diagram above), division of audio files was performed manually. Sounds or events may coincide with one of the divisions, which could interrupt a particular sound or event,

[59] "Octophonic: Eight channels surrounding an audience, a classic for electroacoustic music: typical arrangements are eight spaced on a circle by 45° (orientated with first speaker at 22.5°). Generally all speakers face towards the center of the space in a circle; in my experience it can be adapted accordingly to suit any performance space". Collins, N. 'Introduction to Computer Music', Jon wiley & Sons, 2010.

and in this scenario, the division could be aurally (and manually) offset to accommodate the sound or event.

The investigation of the spatial qualities produced through the sequential spatialisation approach was extended by adding to the microphone array. This process was used to create more accurate spatial representations of the original sounds across the octophonic speaker array. Initial experiments involved field recording of ambient soundscapes using different configurations and microphones e.g. Shotgun microphones targeting moving sounds or events and large diaphragm condenser microphones in mirrored X-Y, A-B and figure of eight patterns. This process was always explored using individual recording devices address the distance between microphone locations. Increasing the number of microphones used in the recording process produced more acoustic information, and therefore, sounding events were recorded in more detail, and, subsequently spatialised more accurately (and dynamically) over the loudspeakers (in the octophonic array).

Figure 3. Sequential Octophonic Spatialisation using a Quadrophonic Recording



The flowchart attempts to represent the process of time-condensing and spatialising a quadrophonic soundscape recording for non-focused or animated octophonic spatialisation of a stereophonic image.

This elaborate spatialisation process becomes useful for capturing heightened representations of stereophonic environments over octophonic speaker arrays. The most effective sonic-images created by using this technique derive from sound-fields that are ambient or textural in nature that, contain no dominant sounds or forces. If the amplitude level of individual sonic events contained within the (source) recording is of similar volume, the overall sound-field will be diffused equally in all of the speaker pairs, which avoids one speaker (or pair) being more dominant than another. The

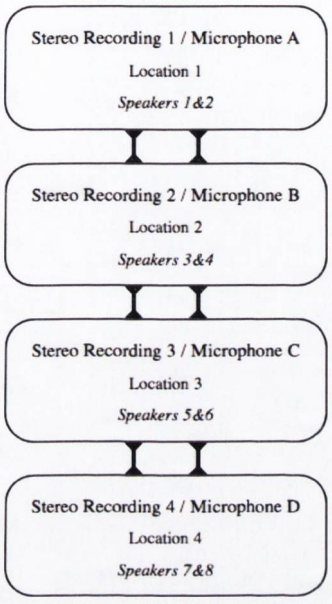
sequential spatialisation technique allows each speaker in the octophonic array to become of equal importance, creating an immersive sonic-image that surrounds the circular performance space. In saying that, to an extent, the listeners position in the (octophonic) listening space will determine the perspective of the sound stage, (sitting at the front of the speaker array will provide a slightly different sound stage and experience to being positioned at the back), as minute time delays emerge as a result of the events positioned in the different speaker pairs. The impact of this effect varies depending on the size of the performance space.

1.3.2. Multi-Device Phonography

After spending investigating spatialisation techniques, the exploration focused on developing the spatial characteristics of the sonic-image created through the (phonographic) recording process. The initial idea for developing this (field recording) process derived from studying recordings of the ambient sound of the city. Subsequently, two anthropomorphic events steered the investigation with variable octophonic microphone arrays. The soundscape of Belfast is often dominated by the sound of airplanes taking off and landing from the airport located in the City (i.e. Belfast City Airport). The city's suburban soundscape is also, intermittently, disrupted by the sound of trains traveling along the city's railway network. Recording experiments using stereophonic and quadrophonic microphone arrays would sometimes provide clear representations of these events, i.e. airplanes passing overhead, or trains clacking on the railway lines. However, the techniques for recording ambient sound did not necessarily lend themselves to capturing these kinds of focused sounds because the captured impressions were never spatially detailed. At this time, auditioning these (mirrored-stereo or) quadraphonic recordings, a phonographic methodology lent itself to capture a better sense of movement and acoustic definition in the octophonic speaker array. The initial idea, to simulate an event or sound that moved through the octophonic speaker array, inspired by the multi-device recording methodology. This elaborate recording process allows unconnected

microphone pairs to record sources at variable distances, and subsequently allows the sonic-image recorded to directly translate to the (speaker pairs in the) octophonic speaker array.

Figure 4. Example: Octophonic Microphone Array to Octophonic Speaker Array



In comparison to the stereo and quadrophonic spatialisation techniques applied, this approach allows (unedited) recordings to be directly translated to the stereo speaker pairs in the octophonic speaker array. In practice, the success of this process is highly dependent on the kind of source material being recorded, in its optimum state, sounds should pass through each of the stereo microphone arrays. Representations of an ambient environment or sound can also be highly successful, however, if there are different sources in each of the stereo pairs the sound field produced will not be connected(aurally) or coherent.

As the investigation focused on recording sources that were captured on individual recording devices at variable distances, a number of different synchronisation methods were explored. The primary synchronisation approach involved a customised netpd[60] patch, that synchronised the recording process on computers in different locations[61]. Testing the logistics of the methodology unveiled that a number of outside factors impacted the latency of the patch and network (i.e. The users computer, the internet connection, the netpd server). Moving away from this complex recording set-up, a few manual processes were used to synchronise individual recording devices. Sound signals were performed and recorded in circular patterns, measured using identical lengths of string, e.g. a ballon popping recorded at four equidistant positions. It was possible to aurally and visually align the sound signal taken from individual devices (in production), although this manual process is subject to a range of variable factors that may affect the time in which the sound signal

[60] More information available at: <http://www.netpd.org/About>.

[61] More information on netpd is available at: <http://www.netpd.org/About>.

took to arrive at each of the microphones (the sound signal may encounter obstacles or forces that could alter or obstruct the speed or path, e.g. wind). Over greater distances, the equidistant measurement and sound signal process[62] becomes problematic, because the sound signal may encounter more physical obstacles in the surrounding terrain. A simple solution for synchronising multiple recording devices across large distances was to use digital radio controlled clocks. Radio controlled clocks are programmed to produce an accurate measure of time[63], and much like synchronising multiple devices with a sound signal (i.e. Ballon popping and measuring rope), the sound of the alarm on the clock can be used to align the recording aurally during production. The wireless nature of the digital alarm negates the need for a form of physical measurement. The process synchronisation is accurate as long as the clocks are synchronised at the same time and location, (experiments uncovered that synchronisation at different times and locations was less consistent). It is also important to note that recording locations should be tested for signal strength prior to a recording, as limited coverage can affect the accuracy of displayed time. There are still many factors that could affect the synchronisation, e.g. where the alarm clock is positioned in relation to the microphone and perhaps even the time drift within individual recording devices. Even though the accuracy, afforded through this methodology, may be questionable, the method produced working results.

Two multi-location recording experiments were used to test the multi-device recording methodology. These were performed at the Belfast City Airport and the Belfast City Hospital Train Station; the multi-location recording experiment at the Belfast City Airport and surrounding locations attempted to follow the flight path of an aeroplane leaving the City. Recording locations, underneath the flight path, were situated where the majority of planes departed, south of the airport

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[62] The distances explored in the Belfast City Airport recording experiment (discussed below) did not allow for manual sound signals, because of the large (uneven) distances between the recording locations.

[63] "The time signal received is controlled by cesium atomic clocks and is accurate to within one second every 1000 years". Radio Controlled Clock User Manual.

(according to information on the Belfast City Airport website[64]). The most ideal recording conditions avoided any extraneous environmental sound and focused on octophonic representation of the aeroplanes passing overhead. Some locations (as seen in Figure 5) were not directly under the flight paths of the planes so the microphone positioning was adjusted during production. For example, location 1 (as shown in '*Figure 5*') was displaced from its ideal vantage point, as it captured the aeroplanes departing from right to left; the ideal position would have been on the runway, which would be logistically impossible. All other microphones were positioned at a 45 degree angle, facing (upwards) towards the oncoming plane.

Figure 5. Recoding Locations: Belfast City Airport

- **Location 1:** Belfast City Airport (David Bird: Edirol R-44).
- **Location 2**: Victoria Park (Dr. Paul Wilson: Sony PCM-D50).
- **Location 3**: Sydenham Bypass (Llinos Griffiths: Tascam HD-P2)
- **Location 4**: Glentoran Football Club (Michael Andrews: Fostex FR-2).

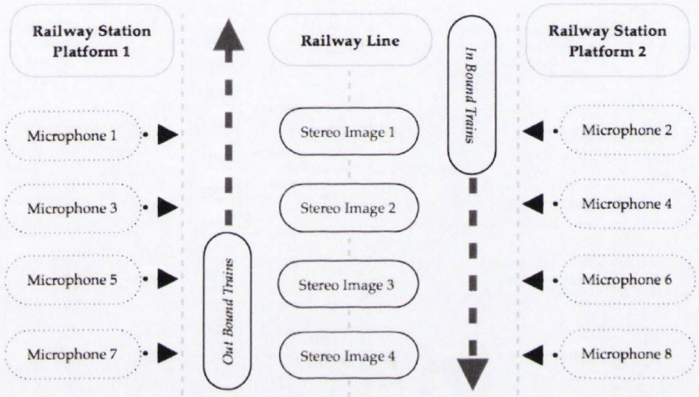
Shotgun Microphones were used in every location. The locations indicated on the map are not exact, this diagram is only created to provide an estimated impression of the locations across the landscape. Online (Google) Map of the Location: <http://goo.gl/maps/cslaO>

The process of capturing a train (at the Belfast City Hospital Station) from multi-point perspectives involved a different approach to that of the previous (aeroplane) methodology, because the landscape of the location required a different configuration. Eight large diaphragm microphones were positioned across the platform and visibly aligned to create four wide stereo images i.e. Microphone 1 aligned with Microphone 2 - Stereo 1, Microphone 3 aligned Microphone 4 - Stereo 2, and so on.

[64] Available at: <http://www.belfastcityairport.com/Flight-Information/Available-Routes.aspx>.

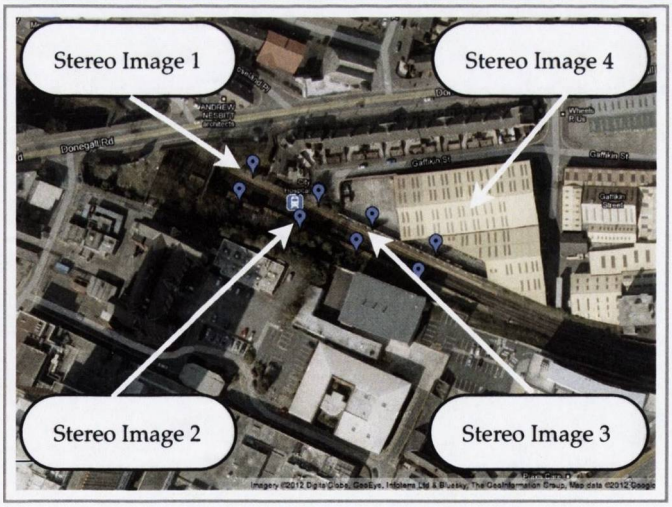
Permission to record at the Belfast City Hospital train station was sought from Translink[65], who reinforced that it was essential to consider the safety of all people involved in the experiment; this included those involved with the recording process, Translink Staff, and the general public. Microphones on stands were positioned at the back of the platform, with the XLR leads and recording devices taped down to the floor.

Figure 6. Recording Plan: Belfast City Hospital Platform



The diagram represents the recording configuration used in the Belfast City Hospital multi-device recording experiment. AKG 414 microphones were used in all locations (using bespoke wind shields especially made for the AKG 414 microphones.

Figure 7. Recording Locations: Belfast City Hospital Railway Station



Stereo Image 1: Microphone 1 - Michael Andrews, Microphone 2 - Chris McClelland.

Stereo Image 2: Microphone 3 - Conan McIvor, Microphone 4 - Imogene Newland.

Stereo Image 3: Microphone 5 - David Bird, Microphone 6 - Llinos Griffiths.

Stereo Image 4: Microphone 7 - David Bird, Microphone 8 - Dr Paul Wilson.

Copyright: Google Maps 2012 - Online (Google)
Map of the Location: <http://goo.gl/maps/6gM5T>

The success of the sonic-image produced by this elaborate recording methodology in the octophonic speaker array is dependent on the particular locations, environment or acoustic (which also includes

[65] Translink is the company in charge of the railway systems in Northern Ireland.
More information available at: <http://www.translink.co.uk/>.

the type of source material being recorded), and microphone configurations. The novel recording methodology is only useful for periodically synchronising individual portable devices at variable distances. Moreover, this is particularly useful when individual devices can not be connected through a physical or sonic measurement. The microphone patterns made possible by this methodology can produce sonic-images that would be otherwise very difficult to design. However, if larger distances are being explored, the sonic information contained within each of the (separate stereo) recordings (and subsequent speaker paris) may not correspond, and will therefore create a spatially incoherent sonic-image in the octophonic sound field. Issues with incoherent sound fields (in the individual microphones and speaker pairs) inevitably arise through recording over distance, which was subsequently highlighted in the sonic results of the investigation. Whilst there maybe merit in exploring this kind of octophonic sound field, the obvious pitfalls here were avoided in this investigation of the acoustically convincing octophonic accounts or impressions of recognisable real-world sounds or events. For example, in the Belfast City Airport experiment the distance between the microphones and the (increasing) speed of the plane created drop outs in the sonic-image with a very strong doppler effect encountered in every location or stereo pair i.e. by the time the plane had entered and left location/microphone 1, it had not started in location/microphone 2, and so on. In contrast, whilst the distance or spacing between the microphones did create small drop outs in the movement (and sound) of the train, the smaller environment of the Belfast City Hospital Train station did not nurture issues with the doppler effect. Even with the small drop outs in the octophonic sonic-image the unedited impression of a train moving from the front to the back (or in and out) of the space proved rather convincing, mainly because the sound of the train was consistently captured in all microphones as it gradually moved through the platform.

In a similar fashion to the sequential spatialisation technique, the overall sonic impression of the results of this methodology in performance is dependent on the listener's position in the octophonic speaker array (or listening space). Sometimes the stereo image projected through speakers 1&2 will

be different to the stereo image in speakers 7&8, and therefore someone positioned at the front of the performance space will gain a slightly different vantage point of the musical materials in comparison with someone positioned at the back. This notion, gaining different perspectives of the same recording or event, was developed further through the investigation and culminated in the creation of '*Thoroughfares*'. The composition allows the listener to experience the work in four different stereo incarnations (or simultaneously over an octophonic speaker array).

1.4. Contribution

The main contribution to knowledge stems from the novel spatialisation and phonographic methodologies (i.e. sequential spatialisation and the multi-device recording methodologies), as both procedures can be successfully exploited by others interested in working with multichannel recording and reproduction. Without wanting to contradict the validity of the compositional work presented, the nine works are considered as being new and original in their own right, but in some respects the music can only be performed, listened to and retrospectively studied rather than successfully replicated. This is mainly because of the kinds of compositional approaches explored over the period of time, for example, the phonographic process involves a number of variable parameters in the act of framing or recording a particular time and place, and during the act of recording there will be on the spot decisions all associated with the unique characteristics previously described e.g. the microphone placement, equipment choice, number of microphones, recording location, recording duration, recording time etc. In this vein, it would be impossible to replicate the sequence of recorded events produced by some of the works, making the sound worlds quite unique. The framework or methodology applied to create the work maybe replicated, but attempts to recreate exactly some of the sonic-images devised (through utilising the same phonographic processes) would be very difficult. The presented body of work simply attempts to create new perspectives and insights into the practice and presentation of fixed-media composition through highlighting a number of methodologies that exploit phonographic practices and sonic representation visited over the course of the research.

Chapter Two

2.1. Phonography: Framing Place, Time and Space

It is safe to say that phonographic (or field) recordings can be made with many patterns and configurations, creating a wide range of perspectives and accounts (in playback). Whatever the sound or scenario, there are a range of variable factors that need to be considered and addressed during the recording process, for example, the technical equipment (e.g. recording device, microphone type, parabolic reflector, microphone stand or boom pole), the recording technique (e.g. polar pattern, input level, signal-noise level, filters and so on), and physical logistics (e.g. the direction of the microphone, the vantage point in the location or acoustic space, the recording duration and the time of the recording). Subsequently, environmental sounds and situations prove challenging to document with a microphone because there may only be one attempt to address the recording process[66]. In the context of the compositional approaches explored, initially, sound design and contextual frameworks were the main strategies employed for forming compositional stimulus at the outset. Over time, framing real-world sounds in outdoor locations using portable recording equipment was used as a catalyst to develop the compositional pathways explored. The application of phonography (e.g. '*Everyday Mimesis; Grey Day*', '*Vivified*', '*Empire Drive*', '*Thoroughfares*', and '*Tempest in a Teacup*') allowed direct references to sounds or events with high acoustical detail (in the octophonic speaker array), without the need for symbolic or metaphoric arrangement. This is epitomised by '*Thoroughfares*' which continuously blurs the boundaries between phonography and sound design in an attempt to bring the focus of the compositional work back to forming complex musical languages with recorded sound. Without necessarily realising it at the time, a focus on using the equipment, exploring recording techniques and procedures in different configurations revealed different kinds of sonic-images. This occurred through arranging

[66] During the recording process, it became highly useful plan the overall process, and in doing this, considering three different levels of focus, namely 'Atmosphere', 'Habitat', and 'Focused' sounds (as suggested by Chris Watson). These different perspectives provide contrasting types of sound fields which can be juxtaposed in the production process to create a highly detailed impression of the environment or event. Because of this, the subsequent treatment of a phonographic sound-field in production is always going to be dependent on the intentions of the engineer or phonographer.

and extending the range of (variable) parameters involved in the recording process, and from this, themes relating to place (or location), space and temporality (i.e. time and duration), became increasingly influential on the creative practice. The following discussion reflects the growing impact of phonography over the creative timeline and related, specifically, to the methodologies explored in, '*Everyday Mimesis; Grey Day*', '*Vivified*', '*Empire Drive*' and '*Thoroughfares*'.

At the outset of the exploration the initial focus was concentrating on creating musical languages that exploited the suggestible, recognisable and impressionistic qualities of recorded and transformed sound. Highly organised sonic-images were designed and built around suggestive contextual frameworks from a pre-recorded sound library using studio related production techniques (e.g. sound manipulation using digital signal processing). Field and studio based recording techniques were used to collect sounds that could be shaped spectrally and contextually in retrospect. '*Tidal Streams*' highlights this approach, as it attempts to create a hyperreal sonic environment through the powerful tidal currents of the sea in the listeners imagination. In an early attempt to develop the phonographic framework through the composition, '*Everyday Mimesis; Grey Day*' was created from a number of multichannel phonographic experiments using mirrored stereo techniques. The sound collection process was quite similar to '*Tidal Streams*' (i.e. involving a range of different sounds and environments), however, the subsequent treatment of the sonic material was different. In dealing with sonic representation through organising sound, the imagery produced from the multichannel (field) recording process proved to be much more convincing that anything that could be devised through contextual framing, symbology or metaphor. Although this notion was based on my aesthetic preference (interested in investigating source-bonded[67] sound), it inspired further investigation into using the phonographic process to create octophonic sonic environments.

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[67] Smalley, D, Defining Timbre, Refining Timbre, Contemporary Music Review Vol. 10, Issue 2.

Considering the role of phonography within the creative process, its application developed into framing the sound of a place over a specific period of time, i.e. the sound of the South of Belfast periodically recorded from a derelict building over the 11th and 12th of July, 2011. The phonographic process, explored in '*Vivified*', attempts to frame some of the sonic events that took place within this environment during the period of time, in contrast to the recording methodology and sound field explored through '*Everyday Mimesis; Grey Day*'. The musical materials, derived from the sequence of events, were selected for their dynamic impact and this filtering process condensed the duration of the sonic impressions captured over the two-day period of time. Although the organisational methodology superimposed different periods of time to create a temporally and spatially scripted sequence of events, '*Vivified*' was the first composition that actually exploited the time (i.e. digital timestamp[68]) of the recording, as both '*Tidal Streams*' and '*Everyday Mimesis; Grey Day*' were built around sound devoid of temporal suggestion. The time (or timestamp) of the recording becomes more relevant in the context of '*Vivified*' because it represents a particular period of time (i.e. the 11th and 12th of July, 2011). Knowledge of the surrounding context associated with this period of time in Northern Ireland will inform the (source-bonding[69] and) listening of '*Vivified*'.

Developing this idea of framing the sound of a place at a particular time, whilst considering the temporal characteristics of the phonographic process, '*Empire Drive*' continues to explore the sound of South Belfast during the 11th and 12th of July, 2012 (the following year). In contrast to '*Vivified*', the recording methodology focused on capturing a continuous (forty eight hour) recording of this two day period, using a single stereo microphone from a fixed vantage point located on Empire Drive. This phonographic process attempted to create a different kind of sound field to the previous investigations. Moreover, the process focused on representing the sonic

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[68] This can be included in the field recording's 'metadata'. The metadata can include information on the file type, date, file size, recording format, and GPS co-ordinations.

[69] Smalley, D, Defining Timbre, Refining Timbre, Contemporary Music Review Vol. 10, Issue 2.

imagery from a two-day period rather than exploiting spatial features. These works underpinned a range of methodologies that informed the phonographic investigation. Furthermore, as the phonographic approach developed, the compositional investigation moved from the initial concern with forming metaphoric and symbolic sonic languages to referential impressions of the real-world that exploited recording frameworks to capture and portray instantly recognisable scenarios. Initially, naturalistic sound fields or impressions were avoided because they lacked the need for organisation; evidence of this comes from surveying the body of work, as '*Empire Drive*' is the only work that does not feature manipulated sound (i.e. spectrally or spatially altered). The field recording practice, which takes time to develop, involves building a working knowledge of technical equipment and understanding how different acoustics or environments can be successfully reproduced. It is entirely possible to survey locations and environments with one's ears and this is very useful when looking for sources to record. However, the microphone will always create a much more neutral perspective that can be played back and studied. This is, of course, highly dependent on the compositional design as, sometimes, the sound field can become highly contrived. In some respects, there is a voyeuristic nature to phonography, that comes from wanting to know what a place really sounds like.

'*Tempest in a Teacup*' and '*Thoroughfares*' employ the most extended arrangements of (multichannel) phonographic sound-fields. *'Thoroughfares'* attempts to fabricate a virtual thoroughfare, by creating a moving sonic impression which traverses a range of urban environments as different (sonic) events take place. The sound of Belfast is framed through the context of the work, which essentially attempts to create the sonic perspective of a journey in and out of the City. Various environments are framed sonically through the work, as numerous multichannel recordings of the city centre of Belfast were taken (e.g. octophonic representations taken from a shopping centre, inside of a bus and the main street on Donegal Place; the representations of planes and trains from the multi-device recording experiments were also included in the work). The multichannel

representations were juxtaposed to create a sense of moving through different environments which formed the structure and narrative. '*Tempest in a Teacup*' used an altogether different phonographic approach, as the work investigates the process of ice freezing and melting by customised hydrophones built from Piezo contact microphones. The premise behind the work was to explore textual spatialisation, whilst recording an event that would normally be hidden to one's ear. Much '*Everyday Mimesis; Grey Day*', '*Tempest in a Teacup*' uses sequential spatialisation techniques to explore the textural qualities of the phonographic sound. Due to the nature of the sound field created by a contact microphone, it was difficult to capture spatially accurate impressions of the process; the microphones were places in the corners of a rectangular container that created four very different mono recordings of the ice freezing and melting. Edited impressions of each monophonic recording were assigned to every stereo speaker pair in the octophonic array, (i.e. Channel 1 - Speakers 1&2, Channel 2 - Speakers 3&4, Channel 3 - Speakers 5&6, Channel 4 - Speakers 7&8). Furthermore, dynamic (point source) events were created with Vector Based Panning to simulate moving sounds or events.

With the framing of time and place in mind, '*Tacet*' was formed to frame the sound of the acousmatic performance space in real-time. The listening experience occurs as the audience enters and fills the concert space before the programme begins. Gradually, the acoustic space is dominated by the 18hz sine tone building in amplitude over the duration of the work. For example, in performance in the Sonic Lab, the 18hz frequency audibly vibrated the fixtures on the acoustic panels and the grated floor, seemingly bringing the (sound of the) room to life. Every listening experience will be different and unique, because each listener may become aware of their own personal (internal) soundscape, something that can not be recorded or replicated (this may involve sound created by focusing on breathing, swallowing or anything that involves physical movement). The aural experience borders on becoming physical because of the sound pressure involved, and, even though the infrasound is difficult to locate, the growing presence of resonance in the

performance space becomes increasingly difficult to ignore. '*Tacet*' was created to exploit the idea for framing a place, time and space in real-time. The composition highlights that the tools and strategies for exploiting and controlling spatial characteristics are only one aspect of the overall creative process. In some respects, '*Tacet*' avoids spatiality altogether, as the omnidirectional qualities of low frequency sound make the source difficult to locate in performance. Arguably, if the spatialisation or recording techniques take precedence over the musical exploration (and experience) then the output is more like an experiment in spatialising sound over multi-channel speaker arrays rather than a cohesive (organised or musical) work. The sound fields produced by '*Everyday Mimesis; Grey Day*', '*Vivified*', and '*Empire Drive*' could be considered as experiments in spatial configuration with stereo phonographic sources, however, these compositions were important in the evolution of the body of work as they allowed the sequential spatialisation and multi-device recording methodologies to be developed and established.

2.2. *'Everyday Mimesis; Grey Day'*

'Everyday Mimesis; Grey day' explores the practice of recording and exploiting everyday environmental sound as source material for fixed media octophonic composition. The compositional process is directly influenced by naturally occurring events. *'Everyday Mimesis'* refers to the process of capturing (and replicating) the everyday soundscape with digital recording equipment, and then using the source material as the foundation and inspiration to create an octophonic work of sonic art (i.e. mimesis is defined as the representation or imitation of the real world in art or literature). *'Grey Day'* refers to a colloquial phrase that describes inclement, dull or rainy weather, which is a common occurrence in the Northern Irish climate; the origin or source of this seemingly colloquial (or British) phrase could not be established, although it has been encountered in conversation on numerous occasions.

The narrative, formed in the composition's discourse, was devised by taking influence and direction from studio-based responses to the periodic location recordings from in and around the Metropolitan area of Belfast. The composition focuses predominantly on exploring the sound of water droplets making contact with surfaces around the landscape, as the acoustics of the environment come to life through the unguent qualities of water. Part of the initial stimulus and inspiration for *'Everyday Mimesis; Grey day'* came from field recording excursions that encountered bad weather where recordings, with snapshot representations of rainfall, unveiled the affects of weather on the sound of the environment during the downpour. During the onset (and offset) of this kind of weather, depending on the ferocity of the downpour, rain can drastically change the soundscape's temperament; water also effects the speed at which sound travels through the air (dependent on the amount of humidity or liquid present), but it is most noticeably changed by the sound of impacting rain. Generally, a 'grey day' would involve any kind of inclement weather, which can encompass cloud cover, fog, mist and rain. These naturally occurring events are arguably difficult to portray musically, so as a form of counteraction, the investigation deals with

abstracted sonic-images and discourse and plays with the recognisability and source of sound objects used. This approach is particularly pertinent to the opening and closing, where the sonic environment is largely unrecognisable in its disposition. The sonic environment contrived actually consists of recordings taken from various locations around the Belfast Metropolitan area at different times of the day. These recordings were superimposed to form a cohesive real-world impression. The collage of these different environmental impressions and perspectives (e.g. from underneath an umbrella and the ambient sound of rain making contact with the surrounding environment), culminates in a snapshot representation of a rainy day or 'grey day' somewhere in the City of Belfast.

The initial objective of the recording process involved translating the spatial qualities of rain interacting with an environment into an octophonic speaker array; a number of multichannel sources were recorded using stereo microphones in mirrored configurations[70]. The spatial qualities of *'Everyday Mimesis; Grey day'* are foremost created from the source recording process, for example, the recording of rain hitting an umbrella was made with two (mirrored) stereo microphones (on stands) positioned directly underneath the umbrella. The subsequent sonic-image, portrayed in the composition, is made from four (edited) sections of the same recording. However various spatialisation techniques were employed to enhance and simulate the spatial image of the overall texture; this involved subtle use of the doppler effect and a customised Vector Based Panning[71] Pure Data patch. Granular synthesis was also used, but it's results are not that obvious because they blend seamlessly with the textures of the rain hitting the umbrella. Equalisation and filtering processes were used to highlight and enhance (or isolate) particular frequencies or parts of the spectrum contained within the recorded environmental sound. Through this process, the

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[70] It is important to note that the recording of the aeroplane is taken from the multi-location experiment performed at Belfast City Airport.

[71] "Vector Base Amplitude Panning", created by Pulkki, V.
Available at: <http://www.acoustics.hut.fi/research/cat/vbap/>.

broadband nature of the environmental recording is dissolved and particular frequencies, textures or tones that would have initially blended into the environmental sound become unveiled.

As the narrative unfolds, the sonic-image builds towards a clear impression of a heavy downpour of rain and the scenic impression becomes mimetic[72] in character. The downpour eventually subsides, revealing the sound of the surrounding environment. This is typified by the sound of an aeroplane passing through the octophonic space, which would have (theoretically) been waiting on the runway waiting for the inclement weather to pass. This kind of (source-bonded) narrative is probably not the first thing that comes to mind in the act of listening to the work and in reality, the contrived narrative is fictional. Upon listening, it is highly probable that this information will go unnoticed or overlooked, but on the other hand, if it is thought about and considered, the devised narrative may become better understood.

[72] Emmerson, S. 'The Language of Electroacoustic Music', Macmillan, 1986.

2.3. *'Empire Drive'*

As a Welsh exile having moved to Belfast, Northern Ireland, I have come to find the traditional culture, customs and practices of the Northern Irish population fascinating; although I am not particularly motivated to participate in all of the events associated with the culture, I have been keen to observe the traditions whilst living in (South) Belfast[73]. As I have become more familiar with the environment and culture, the soundscape of Belfast has also been experienced inadvertently. At particular times of the year, the soundscape (and landscape) changes dramatically according to customary calendar events, namely the public holidays over the 11th and 12th of July. During this time, the soundscape is noticeably different, as part of the population carry out traditional (celebratory) customs associated with their culture. Over certain periods of time, the nocturnal soundscape becomes as sonically dynamic as that of the day[74], as street parties, marching bands and bonfires (of the calibre usually experienced in other regions in the United Kingdom on the 5th of November, Guy Fawkes night) are set up at various sites across Belfast; N.B. I have only had extensive experience of this event in 'the Village', a suburb located in South Belfast. Inevitably, this is carefully overseen by the emergency services, as fire brigades control and manage bonfires, and the police increase their presence across the landscape; the sound of the emergency services is also prevalent in the ambient soundscape, as sirens ebb and flow through the streets. More significant, is the sound of the police helicopter hovering in the sky, at times dominating the soundscape.

'Empire Drive' attempts to capture, document and represent the sonic reality of South Belfast at one of the most active times of the year, from a static vantage point. The composition creates a scaled impression of the soundscape on Empire Drive, during the 11th and 12th of July, 2012, and without

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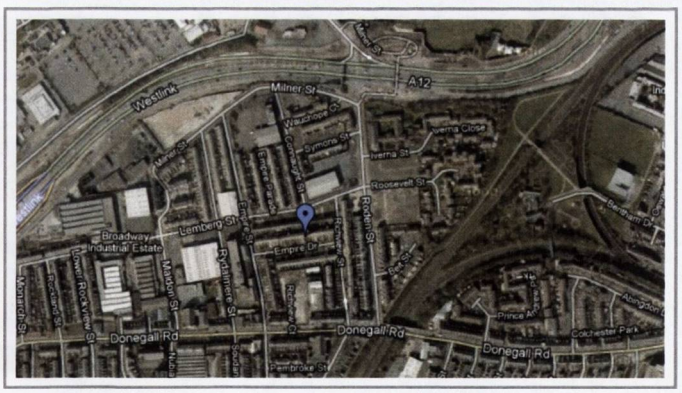
[73] This is more of a sonic study of the environment in which I live, which does not attempt use the associated propaganda in any way.

[74] For everyday perspectives and phonographic representations of the soundscape of Belfast, please visit 'The Belfast Sound Map' project; The Belfast Sound Map was designed by Pedro Rebelo, Rui Chaves, Matilde Meireles and Aoghus McEvoy in collaboration with Max Stein and is maintained by the Sonic Arts and Research Centre, Queen's University, Belfast. Available at: <http://www.belfastsoundmap.org/>.

this phonographic document of the events that took place, the soundscape would probably have gone undocumented and unnoticed. Since moving to Belfast, I have attempted to record this period of activity every year, using differing recording processes and with different levels of success each time; *'Empire Drive'* was formed and framed as a result of this process. *'Empire Drive'* was largely focused on discreet microphones, positioned so as not to affect or change the naturally occurring environmental narrative. In previous years, it had been difficult to successfully capture a sonic impression of this time as there are so many ways in which the procedure could be carried out. Arguably, any recording of the environment taken during this time could represent the occasion. In a rather poetic way, recording the soundscape from out of a recording studio window provides a good metaphor for the framing of the sounds recorded. The static microphone provided a neutral point of view, simply capturing the naturally occurring events in the surrounding environment. Moreover, the duration captured also provided a good representation of the two-day period even though there was no prior indication of what kinds of sound or events the soundscape would feature.

Figure 9. Vantage Point: Empire Drive, The Village, South Belfast



The recording was made from my home studio, using an stereo (Rode NT4) microphone placed inside a wind shield on a microphone stand inside of the room (whilst being extended outside of the window). This elevated vantage point allowed the microphone to be largely out of sight and protected from the elements if they were inclement. The location indicated on the map is the vantage point where the soundscape was recorded; N.B. the microphone was pointing towards Donegall Road.

(Copyright: Google Maps 2012 - Online (Google) Map of the Location: <http://goo.gl/maps/sMFMZ>)

As the recording was taken from the confines of my home, there was evidence or a presence of my everyday life (during a public holiday) in the discourse of the work. Although these artefacts were edited out of the final composition, some aspects can be heard bleeding into the soundscape

recording, for example, the alarm on my phone set to signal when the SD cards needed to be changed[75]. The recording process was limited to the capabilities of the equipment[76], permitting sixteen hours and thirty four minutes (i.e. using two channels - sampling rate of 48k and 24 bits). The sound selection process was led aurally by highlighting the most dynamic parts of the durational recording. In the process of organisation, the audio recordings were laid out chronologically, and aural analysis of the sequential time line took place. Sections of time (audio) were overlapped using simple amplitude fades in a seamless fashion, which makes the selection (and composition) process hard to discern. The sequenced recording unveils a detailed impression of the events that took place over the two day period, and consequentially, a plethora of information on the location. The types of events documented include a marching flute and drum corp, a police helicopter, a range of vehicles, flies passing the microphone an into the room, the twinkling bell on a neighbor's cat and even the wind rustling the leafs on the Cherry Blossom tree in my front garden. In reviewing the recording, it became clear that the soundscape changed over the two day period, but it was very difficult to perceive this whilst listening in real-time, because the process was very gradual and subtle. The changes in the sound of the environment become more obvious if a sample was taken from different times (i.e 3.00-3.01 p.m. sounds very different to 11.00-11.01 p.m). It is difficult to discern which times are actually being played out in the timeline of the work, as the sense of day and night is not readily transparent (without prior indication). This becomes part of the overall listening experience: the soundscape almost challenges the listener to consider the what (i.e. the sound or event) and when (i.e. the time of the day).

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[75] As Lane describes: "Shooting a photograph, video or film involves having to distance yourself from the subject, having to focus and frame them. Sound, however, is not directional; sound is all around, and recording sound can only be done by being there inside the recording and as a result, often being part of that recording Lane, C. 'Listening For The Past, A Composers Ear-Led Approach To Exploring Island Culture Past And Present In The Outer Hebrides', Volume 5, Number 1, 2011.
Available at: <http://www.shimajournal.org/issues/v5n1/h.%20Lane%20Shima%20v5n1%20114-127.pdf>.

[76] I was not able to record forty eight hours without interruption, as I had to change over the 16GB SD card once it was full. Although this process took a matter of minutes, as it was a factor during the recording process, it is worth mentioning.

Prior to beginning the composition, there was no duration in mind and the completed work could have been made much longer. As the 48 hour recording was reviewed, more sonic events seemed relevant and worthy of inclusion. The completed piece, of 48.00 minutes (a 60th of the 48 hour period), felt convincing, even though there was no intentional link to the 48 hour recording period.

In a performance setting and on a concert programme, the duration of the composition is quite difficult to digest, and therefore *'Empire Drive'* is thought to be best experienced in a personal and informal setting and not in a formal performance venue or setting. To this end, the recording is made available for download and disseminated through Youtube[77] and Soundcloud[78], which aim to make the media instantly accessible (with internet access).

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[77] Available at: <http://www.youtube.com/watch?v=9x2yS-Yna_w&feature=youtu.be>.

[78] Available at: <http://soundcloud.com/daijb/empire-drive>.

2.4. *'Vivified'*

'Vivified' is an octophonic representation of the soundscape in South Belfast during the 11th and 12th of July, 2010[79]. The composition explores quadrophonic field recordings from in and around a derelict house, to create a spatially animated and time-condensed account of the events that took place during this time. 'Vivified' is not considered as a factual account of this period of time, even though the compositions discourse is based on the reality of the goings on within the suburban location explored. The work explored the process of translating multi-point microphone arrays into an octophonic speaker array, which ultimately stimulated further exploration into the practice of multi-channel location recording and spatialisation. This work also initiated further investigation into framing the sound of a place at a particular time evident in the previously discussed *'Empire Drive'*. There was no motivation to capture the controversy of the events within the environment during this time[80], it just provided an (overly) active and dynamic soundscape for a multichannel location recording to explore. Over this two day period in particular, the Northern Irish soundscape is more active than usual, as a result of the celebratory atmosphere spread across parts of Belfast.

The word vivified is used in the title as it eludes to the enlivened (or animated) nature of the sonic landscape presented, which epitomises the main objective of this highly organised octophonic sound field. The version of events explored in 'Vivified' portray the most dynamic occurrences and events captured in the field recordings taken over this period of time. The subsequent sonic-image attempts to provide an immersive experience that gives detailed impressions of the events recorded in the environmental space. It would be almost impossible to recreate these conditions, as the environment and the events will never happen again in exactly the same fashion. The work does

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[79] Weather Conditions: 11th July - Mean Temperature 14°C, Average Humidity 66, Wind Speed 8 km/h. 12th July - Mean Temperature 16°C, Average Humidity 70, Wind Speed 11 km/h. Information accessed on July 12th, 2010: <http://www.metoffice.gov.uk/>.

[80] I should reiterate, as with 'Empire Drive', I have no political motivations with the soundscape explored in this work. It was simply an informal survey of the soundscape within this area. This sonic survey was used to explore methods for creating an octophonic impression of the soundscape from quadrophonic recordings.

not provide a factual octophonic representation of the 11th and 12th of July in Belfast, rather '*Vivified*' can be understood as an arranged sonic impression of this time, built from the set of field recordings collected over the two day period.

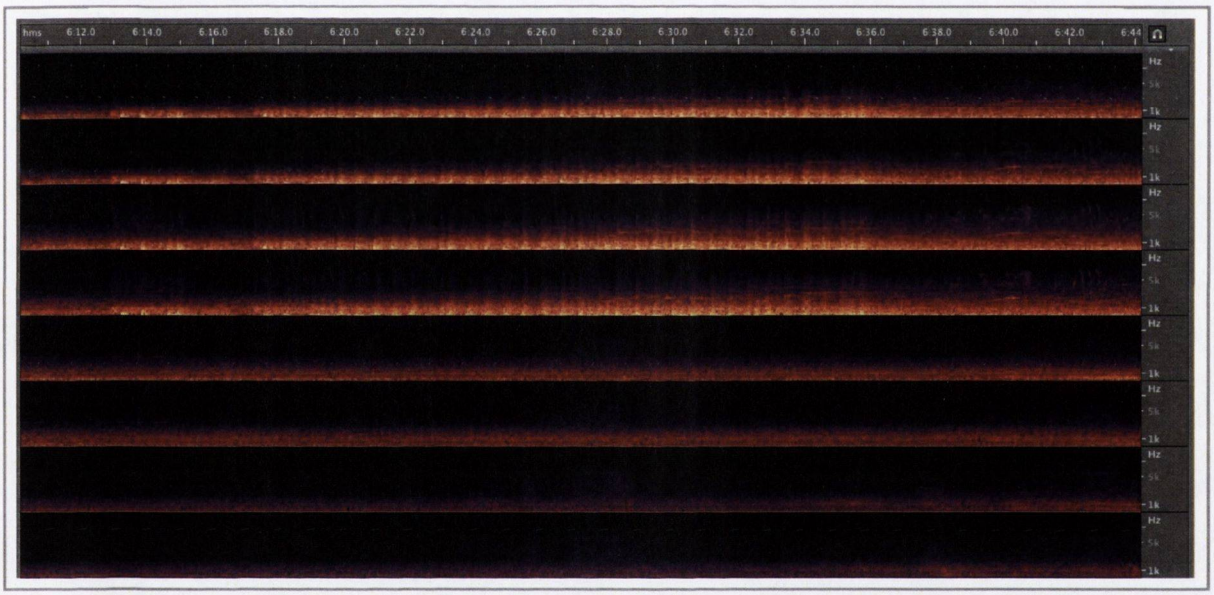
The sonic events explored in the work are set in overly active forms, which is a result of the sequential spatialisation re-animation process. This involved (non-destructive) digital signal processing techniques and superimposing (or layering) different sections of the source recordings to create the heightened representation of the event (time stretching[81] and spectral delay was used to create more and or less dynamic and abstracted representations of the recorded source material). This was not an extreme process and is intentionally not readily identifiable in the composition's timeline, rather, the transformation of sound is used to blur the overall texture, and to supplement and intensify the overall environmental texture e.g, with spectral delay or filtering, the frequency spectrum becomes enriched as certain frequencies from the environmental recording can be made more pronounced.

The composition repeatedly references the surrounding (recording) environment, which features an octophonic representation of the wind passing through the derelict building. This feature allowed the different scenes and scenarios to grow out of the indoor scene, gradually coming to life through growing in amplitude and activity. Different levels of focus are used for the individual scenes, which allows a variety of contrasting octophonic sound fields. The sonic events that lent themselves to being spatially re-animated with the sequential spatialisation technique were treated in this way (e.g. Fireworks). The level of focus used is highly dependent on the type of source recording process (e.g. microphones position in relation to the sound being recorded) and the sound itself, which ultimately dictates the spatialisation approach. Ambient sound fields were relatively simple to diffuse octophonically, as the splits in the sound file happened almost arbitrarily. More

[81] Pure Data Phase vocoder, Benjamin R. Saylor.
More information available from: <bensaylor@fastmail.fm>.

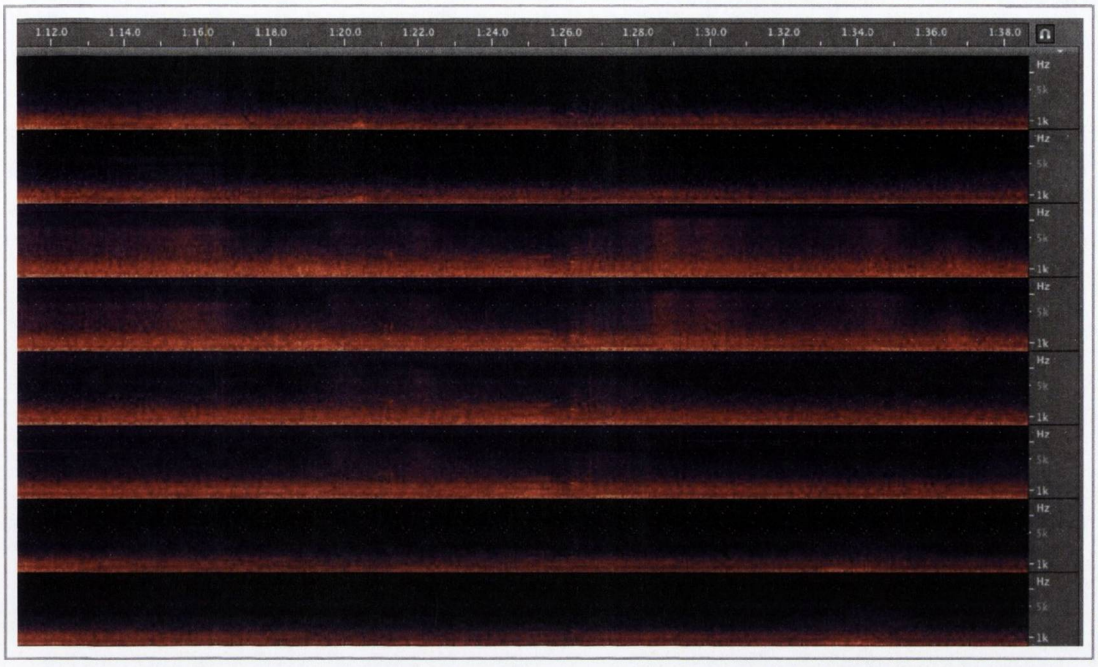
focused sounds became more difficult to divide as the splits coincided with the (focused) sonic events. In attempting to spatialise focused sounds, the sequential spatialisation technique proved difficult to use because it creates acoustically inaccurate sound fields that become particularly evident in the octophonic setting. Rather than being spatially manipulated through the sequential spatialisation technique, focused sounds (e.g. the marching flute and drum band) were given definition through a frontal (amplitude) focus (i.e. involving speakers 1&2 and 3&4) in the octophonic speaker array.

Figure 10. Quadrophonic Recording - Octophonic Speaker Array with Frontal Focus



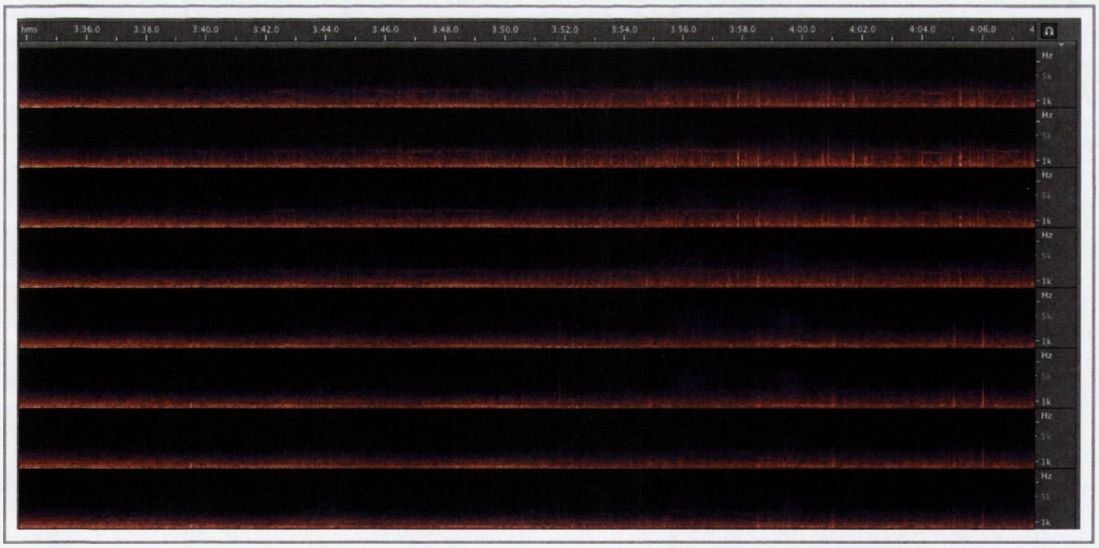
The spectrogram highlights an octophonic sound field with a frontal focus (i.e. from the top down each track represents the individual channels/speakers e.g. 1, 2, 3, 4, 5, 6, 7, 8). This feature is visibly apparent through the higher amplitude in the first four channels (i.e. channels 1, 2, 3, 4 projecting quadrophonic Marching Band impression, and channel 5, 6, 7, 8 projecting a quadrophonic ambience. This configuration portrays an impression of the pipe and drum band marching along Donegall Road as it was captured in the front of the microphones sound field from inside of the house. This best translated in playback using a frontal focus or sound stage which mimicked the recording configuration.

Figure 11. Quadrophonic Recording - Intimate Octophonic Impression



The spectrogram highlights an octophonic sound field with an intimate (quadrophonic) impression, (i.e. from the top down each track represents the individual channels/speakers e.g. 1, 2, 3, 4, 5, 6, 7, 8). In configuring this intimacy, channels 3, 4, 5, 6 project a quadrophonic impression of the wind, and channels 1, 2, 7, 8 project a surrounding quadrophonic ambience. The impression of the wind appears to be more intimate because of the proximity of the speakers to the listener.

Figure 12. Monophonic Microphone Array - Octophonic Speaker Array



The spectrogram demonstrates diffusing four stereo impressions taken from the same environment, (i.e. from the top down each track represents the individual channels/speakers, e.g. 1, 2, 3, 4, 5, 6, 7, 8). Crossover events are evident in all of the stereo sound fields, however, more minute sounds or events only appear to be captured in the individual (microphones or) sound fields. The smaller events embellish the overall sound field, making a highly dynamic stereo-octophonic impression.

2.5. *'Thoroughfares'*

Thoroughfare is a term used to describe a place of passage or a transportation route from one location to another; i.e. roads, motorways and footpaths are all considered as being thoroughfares. The initial inspiration for the composition stemmed from the idea of creating a virtual thoroughfare in the octophonic speaker array, almost as if sounding objects or events pass through the hyperreal space. Broadly speaking, on a macro level, the composition attempts to display the City Centre of Belfast as a large-scale thoroughfare. Whilst, on a micro level, the locations explored through the composition could be defined as smaller thoroughfares (e.g. train stations, bus stops, and shopping centers). The composition does not necessarily create a representation of a single thoroughfare or location, rather it presents a collection of locations and situations that could be considered as being thoroughfares in themselves. In this context, *'Thoroughfares'* attempts to generate a highly impressionistic representation of a journey through the sonic-image of Belfast City Centre. The locations and events that take place were organised to create a seamless narrative through the unfolding of the sonic work, even if the discourse explored is highly impressionistic.

To an extent, the composition is connected to the provenance of the source material which is, primarily, taken from recordings of Belfast City Centre. The provenance of the material is accentuated through sound signals[82] that directly link the sonic-image portrayed to the City of Belfast. However, references (or soundmarks) are intentionally difficult to distinguish, and are not considered as being readily identifiable, for example, the Translink announcement at the train station platform (*"the train approaching platform 2 is the 19.30 train to Belfast City...."*) which occurs before the train enters the train stations platform, although a voice can be heard, what is said is not discernible. These, intentionally difficult to distinguish, features allow the composition to be interpreted without the connection to the knowledge of the Belfast soundscape. Ultimately the

[82] Although source-bonded (D. Smalley, Space-Form and the Acousmatic Image) sounds are always recognisable, a soundmark identifies the location of the event recorded. As R. Murry Schafer defines, sound signals are "a unique sound that a community identifies with, and that identifies a community" Schafer. R. M, The Tuning of the World.

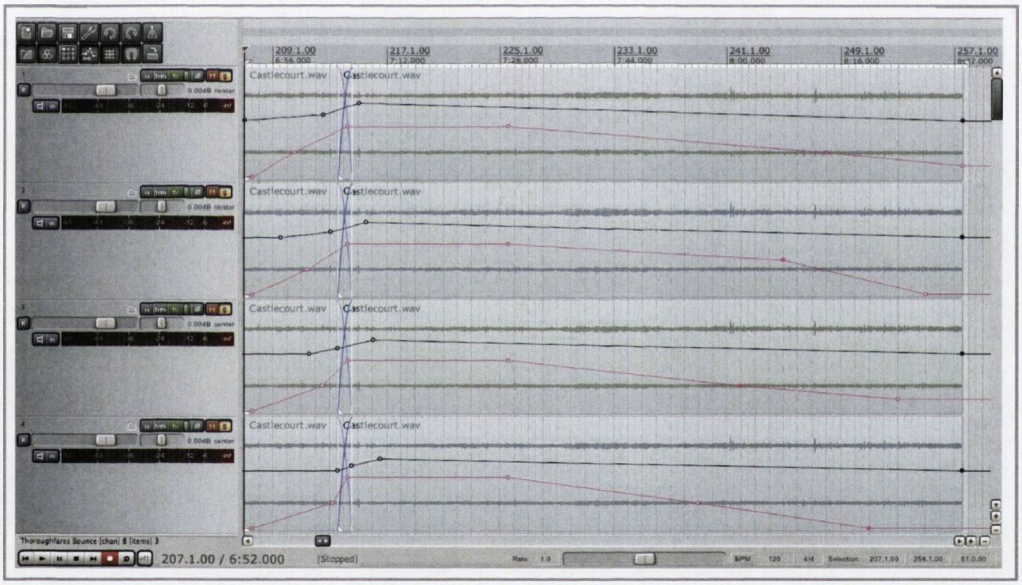
composition can be likened to any urban environment to which the listener can relate, through their own encounters and associations.

In realising the suggestive hyperreality of a thoroughfare, the compositional process involved juxtaposing different multichannel field recordings in order to document events and spaces from two types of perspectives. Firstly, portable recording devices allowed moving and transitional perspectives, which readily translated to the octophonic speaker array, for example, the moving representation from inside of the Europa bus station onto Victoria Street. Secondly, static (multichannel) recordings of events and spaces were also captured but treated in production with the sequential spatialisation technique which portrays highly animated impressions of the source recording; i.e. durational recordings were dissected and superimposed, allowing multiple sections of the same recording to be projected at the same time, creating a spatially animated (and condensed temporal) impression of the locations or event recorded.

In creating a naturalistic transition from one recording (or perspective) to another and to simulate sounds (or events) entering and leaving the space (i.e. from the front or back of the speaker array), amplitude-fades and high frequency filters were applied in sequential fashions through the different stereo channels/speakers in the octophonic array. For example, in simulating a frontal motion (as demonstrated in Figure 16), the signal in the rear speakers (i.e. Speakers 7&8) would be faded out and (high frequency) filtered first. This process, sequentially repeated in speakers 5&6, 3&4, and 1&2, provides a gradual frontal focus that weights the sound field towards the front of the space (i.e. speakers 1&2). Digital signal processing techniques were also used to simulate the moving perspectives explored, and accentuate particular aspects of the source recordings. In a similar fashion to the sequential transition technique, different levels of abstraction (e.g. band-pass, comb and resonant filters) were used to varying degrees in the individual channels or speaker pairs.

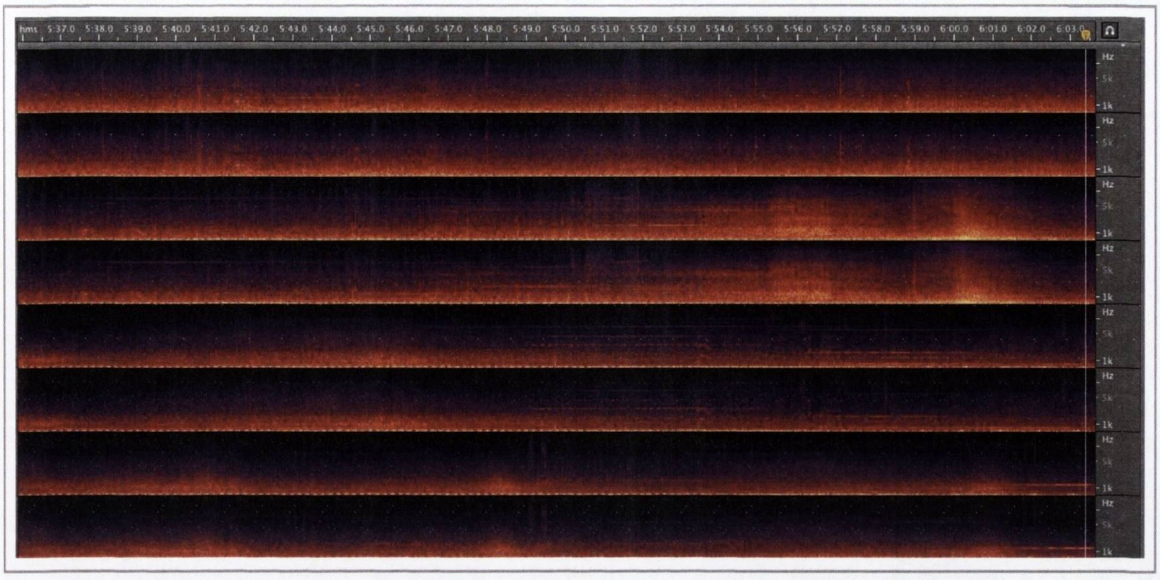
The sequential processes explored, e.g. multi-channel recording processes, and sequential amplitude/filtering techniques, unwittingly created slightly different timelines in the sound fields of the individual stereo speaker pairs (in the octophonic array). Although it is not possible to fully appreciate these differences in the (full) octophonic account, the work can be effectively experienced in four differing stereo incarnations rather than in an octophonic setting, i.e. Version 1 - Stereo 1&2, Version 2 - Stereo 3&4, Version 3 - Stereo 5&6, Version 4 - Stereo 7&8. In comparing the different incarnations, the time differences afforded through the sequential techniques applied become more apparent.

Figure 13. Sequential Automation for (frontal or backwards) Transitions



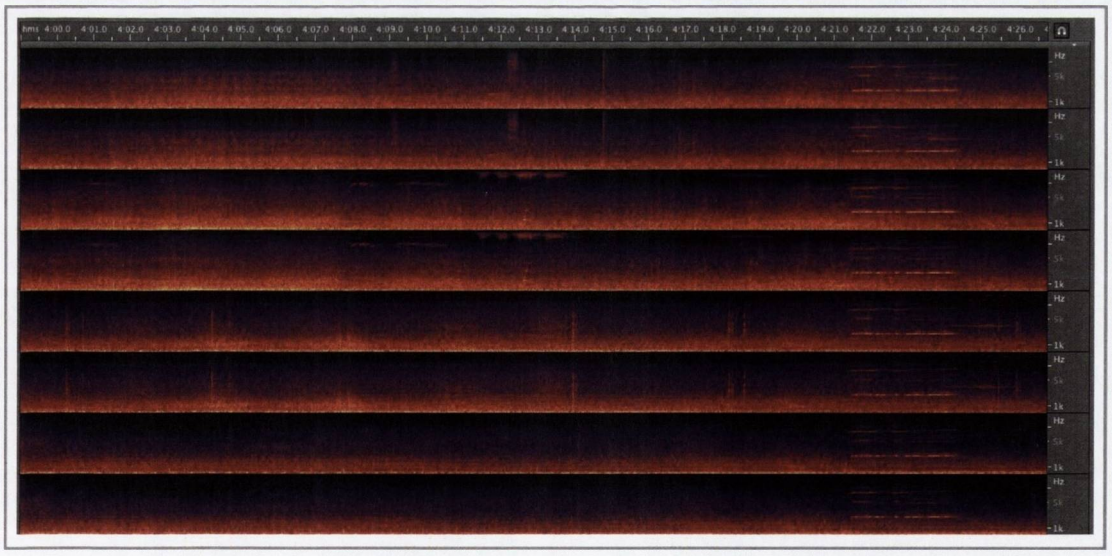
The screenshot demonstrates the manuel automation programmed to control amplitude and higher frequencies (with a low pass filter) fades in the sequencer (Reaper, Cockos), (N.B. the pink lines represent the frequency of the low pass filter and the black lines relate to amplitude. From the top down each track represents a stereo channels/speaker pair e.g. 1&2, 3&4, 5&6, 7&8). In this instance, the sonic impression of castle court shopping centre is unveiled in the front speaker pair (i.e. Speakers 1&2) because the filter (revealing higher frequencies) and amplitude fades occur before any of the other channels. This process is sequentially repeated in the following speaker pairs. At the end of the excerpt, the gradual process is reversed, and the automation process gradually focuses the sound field in the front of the octophonic speaker array.

Figure 14. Synchronised Stereophonic Impressions Diffused Octophonically



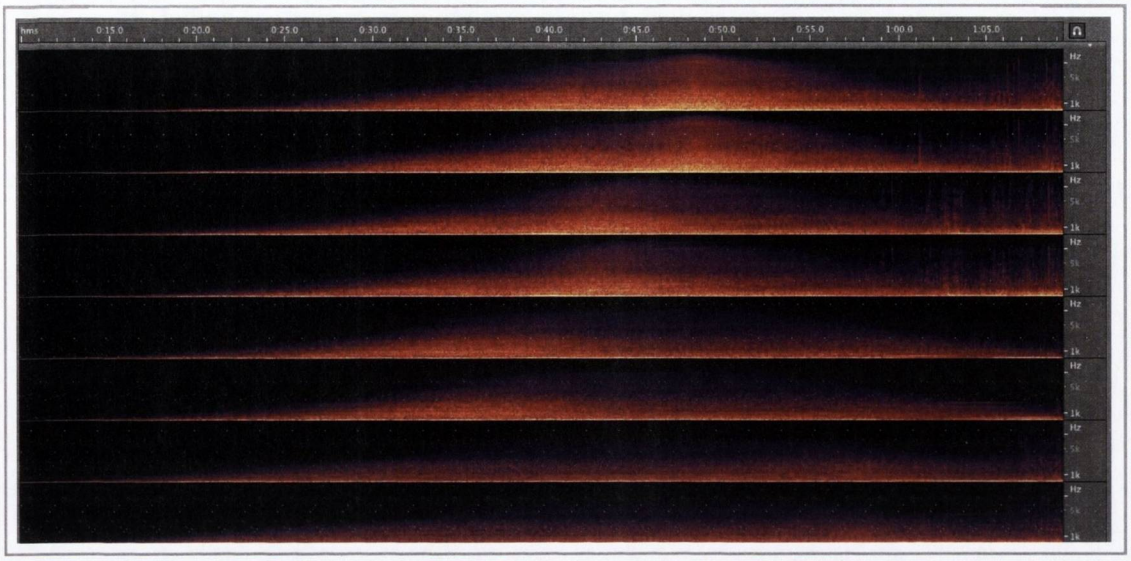
The spectrogram demonstrates diffusing four different stereo impressions taken from the same environment, (N.B. from the top down each track represents the individual channels/speakers, e.g. 1, 2, 3, 4, 5, 6, 7, 8). There are no crossover events in the individual stereo sound fields because of the distances explored (between the microphones) during the recording process (i.e. four individual devices moved through the space independently).The lack of overlapping events can make the octophonic sound field in-cohesive.

Figure 15. Synchronised Stereophonic Impressions With Crossover Events



The spectrogram outlines two different recording processes, (N.B. from the top down each track represents the individual channels/speakers, e.g. 1, 2, 3, 4, 5, 6, 7, 8). The sound field before 4.19' is made from microphone pairs taken from the same environment at distance which produced minimal (to no) crossover events. After (i.e. 4.20'), the octophonic microphone array was in close proximity which provided allowed sonic events to (acoustically) cross over into the other speaker pairs.

Figure 16. Moving Stereophonic Sonic-Images in the Octophonic Speaker Array



The spectrogram highlights the opening section that portrays a train leaving a station platform captured with static microphones during the multi-device recording experiments, (N.B. from the top down each track represents the individual channels/speakers, e.g. 1, 2, 3, 4, 5, 6, 7, 8). The impression starts at the back of the octophonic space (e.g. Speakers 7&8) and dissipates through the front (e.g. Speakers 1&2). In production, the gradual unveiling of the train was created with sequential amplitude fades and filtering of the higher frequencies (e.g. from 0.00-0.40).

2.6. *'Tacet'*

The composition *'Tacet'*, attempts to frame the internal soundscape of its listener through experimenting with low frequency sound or bass, generally known as infrasound. *'Tacet'* aims to highlight the pleasure of listening with a very simple musical idea. Low frequency sound below 20 hertz that borders on the limits of human hearing, and even though this kind of sound is thought to be experienced in the everyday, it is never particularly audible because it is always mixed in with a collage of other frequencies. The composition uses the idea of unmasked infrasound, coupled with the notion of a listener's internal soundscape, which is made up of (internal) bodily functions, like breathing or swallowing. The composition does not force the idea of the internal soundscape on the listener, as it is only possible to suggest the idea of listening to the bodies internal sounds, but once the suggestion has been made, it is safe to say that ignoring these sounds becomes increasingly difficult. This (suggestive) process attempts to make the cognitive system of the listener consciously aware of automatic processes that would not be the centre of one's perception. In essence, there are two elements to *'Tacet'*, one that is structured and controlled by a Pure Data (pd) patch and another that is completely influenced by the reaction and general sound of the audience in the performance space.

Inspiration for *'Tacet'* came from the idea of using technology to extend or affect the listening process, and through wanting to frame sound without using the phonographic process. Speaking about my experience in listening to recorded sound more generally, I have spent a great deal of time listening to audio through technology, which is thought of as being an altogether different experience to physically experiencing an environment[83]. Fundamentally, technology allows us to gain an alternate listening perspective, as the technological recording process is inhibited by humanistic processes (the cocktail party effect etc). Ultimately, a recording can be considered as a

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[83] As Cathy Lane outlines, "[...] listening mediated by technology can be a magnifying experience for the sound recordist", Lane, C. 'Listening For The Past, A Composers Ear-Led Approach To Exploring Island Culture Past And Present In The Outer Hebrides', Volume 5, Number 1, 2011.
Available at: <http://www.shimajournal.org/issues/v5n1/h.%20Lane%20Shima%20v5n1%20114-127.pdf>.

factual representation or document containing detailed information about the environment that is explored. However, the interpretation through the ears is consciously and unconsciously controlled. This line of thinking gave rise to considering how technology can be applied to assist or enhance the humanistic listening process, without using a microphone.

In performance, I would not deliberately draw attention to the presence of infrasound in the space before the audience enters. The ideal performance scenario for 'Tacet' would be to start the composition (patch) before the audience enters the room, and to have the sub frequency sound (or patch) active whilst the audience member take places in the concert hall; this composition is perfect for performance as a prelude to an acousmatic or fixed media concert programme. Ideally, the audience will not be aware the infrasound is being projected upon entry to the performance space, it is just suppose to sit subtly in the background, gently reacting to the sound emanating in the space. Upon reading the programme notes, which are placed on seats before the performance, the infrasound emanating in the space should be identified.

'Tacet' was tested, formulated and written in the Sonic Lab[84] at the Sonic Arts and Research Centre (SARC), at Queen's University, Belfast (QUB). The performance of *'Tacet'* is flexible in the sense it may be tailored to or performed in any space, providing there are speakers (subwoofers) or custom built devices capable of reaching a minimum of 19 hertz. In saying that, this composition is foremost intended for concert halls or similar types of performance spaces to the Sonic Lab at SARC. With performance spaces such as the Sonic Lab (at SARC), we have rather unique sounding spaces, that can quite often be isolated from the sound of the outside world. This is of course, not the case with all sound theaters, as the portability of sound equipment can allow for

[84] The Sonic Lab, Sonic Arts and Research Centre, Queen's University, Belfast.
More information available at: <http://www.sarc.qub.ac.uk/sites/sarc/AboutUs/TheSARCBuildingandFacilities/TheSonicLab/>.

performance in almost any location (e.g. the Birmingham Electroacoustic Sound Theatre[85] have a completely portable rig, which can be set up in a range of configurations, in almost any location). The composition is written for a minimum of one to an infinite number of speakers (i.e. Subwoofers or any form of device capable of handling such frequencies). The locations of the speakers in the performance space is not specified, as bass frequency sound is omnidirectional, rendering the speaker positions unimportant, although multiple subwoofers will add to the overall amplitude of infrasound in the space.

The composition was created through performing informal listening tests with (Genelec 7071A) sub woofers (used in the Sonic Lab) and researching technical specifications (the technical specifications of a Genelec 7071A[86] subwoofer states the speaker is capable of handling frequencies down to 19 Hertz), I can confirm the Genelec 7071A is capable of projecting sine waves (with a flat frequency response) down to 19 hertz (and above). This was the main reasoning behind choosing to center around 19-20 hertz, as it is not pushing the speaker past its (lower) limits. I cannot however, be sure or state that this will be the case for all other subwoofers, so it is important that the composition is tested on any speakers intended to be used for performance, before it is performed.

In researching infrasound, it became easy to find information that suggested the frequencies involved are generally considered outside of the average human listening range, and that the level we can hear infrasound is said to be heavily dependent on the hearing thresholds of the individual listener[87]. Through exploring this phenomenon by performing informal listening experiments that

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[85] "The Birmingham Electroacoustic Sound Theatre (BEAST)", University of Birmingham.
More information available at: <http://www.birmingham.ac.uk/facilities/BEAST/about/index.asp>.

[86] Available at: <http://www.genelecusa.com/products/subwoofers/7071a/>.

[87] "It has often been proposed that we do not sense infrasound directly, but that we simply hear higher harmonics produced by distortion in the middle and the inner ear (see e.g. Johnson (1980)). If this were true, it would then be reasonable to assume that the subjective quality of a 15-Hz tone would be comparable to that of a tone or a combination of tones at higher harmonics like 30 and 45 Hz". H Moller and C.S. Pedersen, 'Hearing at low and infrasonic frequencies', Noise Health, Vol 6, Issue 23, Apr-Jun 2004, pg 37-57. Available at: <http://is.gd/J9KSh6>.

involved a range of sounds from 200 hertz downwards in studio listening conditions, I can corroborate findings presented by with Moller and Pederson that each tone has a different characteristic "in timbre, pitch and general quality[88]" (Moller and Pederson). What's more, this type of sound, although still causes pressure in the ear drums, crosses into sensing sound through other parts of the body[89].

Research into infrasound can be found in various environments, subject areas and topics (in music, natural occurrences, medicine and even the paranormal)[90], epitomised by evidence that suggests certain parts of the body have a resonant frequency; NASA states that the resonant frequency of the eye is 18 Hertz[91], and what is known as the Schumann Resonance, which is the natural electromagnetic field of the earth being in the same range as alpha brain waves, which is 7.83 Hz. Infrasound has also been strongly linked with being the cause of some paranormal experiences, with an infamous account from the 1980s that involves Vic Tandy, a British Engineer and lecturer in Information Technology at Coventry University in Warwickshire. Whilst working in a research laboratory for a medical manufacturing firm, in his own words "I was sweating but cold, and the feeling of depression was noticeable - but there was also something else. It was as though something was in the room with me[92]". Tandy then claimed to have seen a spirit emerging in his peripheral vision, but when he turned to face the figure, it had vanished. The next day, whilst

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[88] H Moller and C.S. Pedersen. 'Hearing at low and infrasonic frequencies', Noise Health, Vol 6, Issue 23, Apr-Jun 2004, pg 37-57. Available at: <http://is.gd/J9KSh6>.

[89] Bekesy (1936) also noted that it is difficult to distinguish whether the sensation is of a pressure or tactile nature, or of an auditory nature, H Moller and C.S. Pedersen. 'Hearing at low and infrasonic frequencies', Noise Health, Vol 6, Issue 23, Apr-Jun 2004, pg 37-57. Available at: <http://is.gd/J9KSh6>.

[90] For example, "The following are examples of typical low-frequency sound sources: ventilation systems, compressors, idling trucks and the neighbour's stereo. Infrasound at an audible level is usually found on the car deck of a ferry and when driving a car with an open window. However, infrasound is most often accompanied by sound at other frequencies, so the experience of listening to pure infrasound is not common". H Moller and C.S. Pedersen. 'Hearing at low and infrasonic frequencies', Noise Health, Vol 6, Issue 23, Apr-Jun 2004, pg 37-57. Available at: <http://is.gd/J9KSh6>.

[91] Mechanical Resonant Frequency Of The Human Eye In VEVO, Aerospace Medial Research Laborite, 1976. Available at: <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA030476&Location=U2&doc=GetTRDoc.pdf>.

[92] Tandy, V. 'The Ghost in the Machine', Journal of the Society for Psychical Research, Vol 62, 1998. Available at: <http://www.hauntmastersclub.com/files/ghost-in-machine.pdf>.

polishing a sword in a vice, he noticed the blade vibrating even when clamped in the vice, from this experience Tandy pondered the idea of infrasound in the laboratory. Further investigation showed that the infrasound trapped in the laboratory was as its highest next to Tandy's desk, right where he has seen the ghost. The source of the infrasound was a newly installed extractor fan. Tandy recreated this experience, and with the assistance of Dr. Tony Lawrence, he published his findings in the Journal of the Society for Physical Research[93]. Their research concludes that infrasound at or around a frequency of 19 hertz, has a range of physiological effects, including feelings of fear and shivering. Though this had been known for many years, Tandy and Lawrence were the first people to link it to ghostly sightings.

Perhaps more pertinent in the context of the infrasound in '*Tacet*', the most infamous experiment that involves infrasonic sound and music involves Sarah Angliss, an English Acoustic Engineer. The experiment performed used an extra-long stroke subwoofer in a sewer pipe[94] (around 6 meters long) that was driven by a sine wave generator and amplified by a power amp (with a flat frequency response down to 10Hz). "Infrasonic (or what Sarah Angliss defines as 'Soundless Music') was a carefully controlled psychological experiment, in the form of two back-to-back concerts. These concerts were highly unusual because some of the music was laced with infrasound (i.e. extreme bass sound, below 20Hz in frequency)". The results reported results of the experiment are interesting, as they suggest that "infrasound boosted the number of strange experiences reported among the audience, even among those who were unaware of its presence. Unusual reports included a sense of coldness, anxiety and shivers down the spine. On average, infrasound boosted the number of strange experiences by around 22 percent. It also increased the intensity of any

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[93] Tandy, V. 'The Ghost in the Machine', Journal of the Society for Psychical Research, Vol 62, 1998.
Available at: <http://www.hauntmastersclub.com/files/ghost-in-machine.pdf>.

[94] Angliss, S. 'Infrasonic - Haunted Music?'.
Available at: <http://www.sarahangliss.com/talks/infrasonic>.

feelings reported[95]". In comparison to Sarah Angliss' work, the infrasound used in 'Tacet' is not accompanied by any other generated sound or music. Tacet' attempts to frame a moment in time and space whilst magnifying the listening experience by introducing infrasound into the performance space. In reality, 'Tacet' is unconcerned with creating a legitimate scientific study on infrasound and human hearing, rather attempts to rekindle the discussion (in a cage like fashion) of what can be considered music? Does this qualify as a composition? Can a patch be considered a replacement for a physical score? Can I put compositional boundaries around a period of time? I concur with Cat Hopes analogy, which also echos the sentiment of Varése[96], "Vibration obviously occurs in many areas outside of music, but to consider such vibrations as art or music, this material would need to be organised , contemplated, created and/or controlled to some extent"[97]; which *'Tacet'* effectively explores. It should also be noted, from the reference to Cage above, *'Tacet'* also unashamedly takes inspiration and influence from John Cage's 4'33", but in contrast to this infamous work, *'Tacet'* is supposed to be performed in acousmatic conditions in an electroacoustic performance space, similar to the Sonic Lab at SARC, and therefore this composition is firmly positioned in the acousmatic tradition as there are no performers to distract the overall experience which is solely based around listening.

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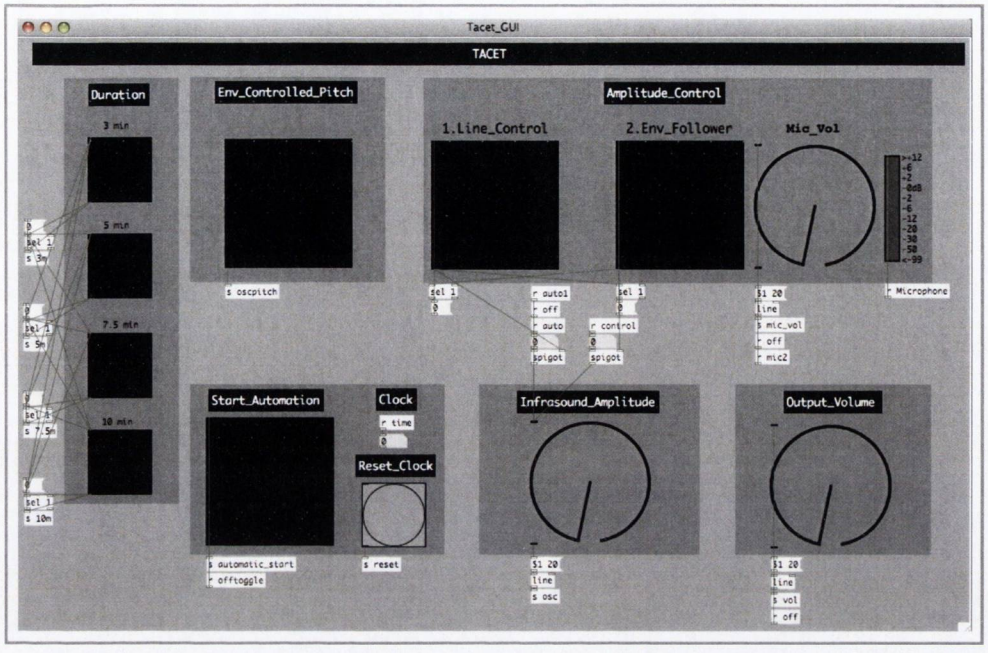
[95] Angliss, S. 'What Did We Find?', Sound Talks.
Available at: <http://www.spacedog.biz/extras/Infrasonic/results.htm#100words>.

[96] Edgar Varése coined the term 'organised sound' for his own music. In my opinion, this is still a highly useful way for describing sound based composition. Varése, E & Wen-Chung, C. 'The Liberation of Sound', Perspectives of New Music, Vol 5, 1966.

[97] 'Hope, C. 'The Possibility of Infrasonic Music'.
Available at: <http://cathope.com/wp-content/uploads/2008/11/chopevinframusic.pdf>.

Figure 17. 'Tacet': Pure Data Graphic User Interface



The infrasound featured in the work is generated by a single sine wave in the pure data[98] patch. The generator can be controlled to generate infrasound in a four different configurations, firstly, manually, using an automatic (durational) fade or in response to the sound of the room (i.e. in the manual approach the amplitude of the sine wave is controlled using the volume knobs at the users own will). Secondly, the automatic fade is controlled by (line) parameters inside of the patch (i.e. and can be made into 3.00, 5.00, 7.30 or 10.00 minute durations). Thirdly, the room response method reacts to the general sound of a concert audience entering and settling down into the space (i.e. this requires a microphone to measure the amplitude of sound in the performance space which directly controls the overall amplitude of the infrasound generator). Lastly, there is also an option for the microphone monitoring the room to control the pitch of the infrasound generator; which is selected or ignored inside the pure data patch. For more information on the performance instructions and the variable parameters involved in the patch, please see the performance instructions included in the patches folder (on the provided DVD).

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[98] Puckette. M "pure data (pd)", Object Orientated Programming Language, IRCAM.
Available at: <http://puredata.info/>.

Figure 18. Tacet: Performance Instructions

'Tacet' is intended to be performed as a prelude to a concert, as the composition attempts to accompany the sound and process of an audience entering and settling into the performance space. Ideally, the programme notes (for the overall concert or *'Tacet'* alone) should be placed on the seats of the performance space prior to the audience entering the room. The programme notes (for *'Tacet'*) should not be disclosed to the audience prior to entering the space, in an attempt to make audience members realise they are being exposed to infrasound sometime after entering the performance space. As the infrasound is not readily audible, the programme notes outline that fact that infrasound is being projected in to the space and attempts to suggestively highlight the external and internal sounds made by audience members. Through the suggestive description, the listener is guided into becoming aware of their own internal soundscape, which involves the sound of breathing, swallowing and any other internal sounds. The impact of the low frequency sound coupled with the suggestive description is thought to draw more attention to the listener's internal soundscape. Consequentially, this elaborate process attempts to frame the audience's realisation of the infrasound and the soundscape of the performance space through the bounds of the composition.

Equipment Requirements

1. Sub Woofer or speaker capable of handling 19-20 Hz

A minimum of one to an unlimited number of speakers (capable of handling infrasound) can be used

2. Audio Interface
3. Condenser Microphone
4. OS X (10.5 and above)
5. The latest version of Pure Data Extended

Available at: <http://puredata.info/downloads/pd-extended>

In Setting Up

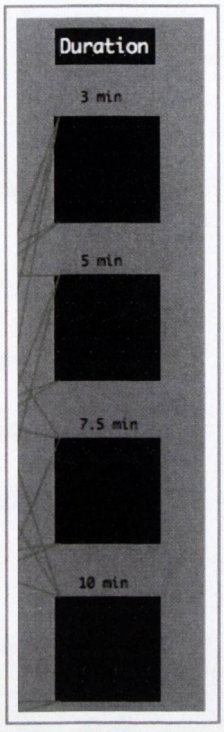
1	Connect audio interface
2	Connect and test (mono condenser) microphone
3	Open Pure Data
4	Configure audio settings - *Pd-extended/Preferences/Audio Settings*
5	Switch DSP on - *Media/audio ON (shortcut cmd + /)*
6	Open Tacet.pd - *File/Open/Tacet/ Tacet.pd*

The Variable Parameters

The composition uses pure data sound generators to control the subtle introduction of infrasound frequencies in the performance space. The pure data patch can be performed and controlled using different parameters which need to be configured before the performance. The parameters and control method indicated is only thought of as an outline, as if the user desires the infrasound generators can be controlled manually. N.B. The (variable) controls and parameters (if applied) are selected before the performance starts, and should not be changed during performance; although the 'reset_clock' function resets the patch, before performance it is recommended that the patch be closed and reopened. The patch is designed to be controlled in stages, as which will be outlined in the following explanation.

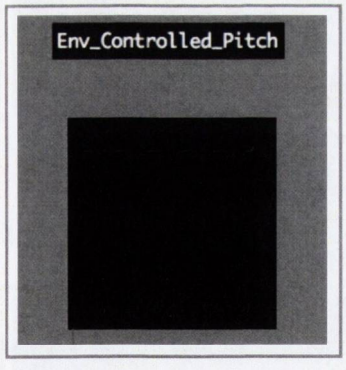
Figure 19. Tacet Performance Directions

Step 1 - Set Duration



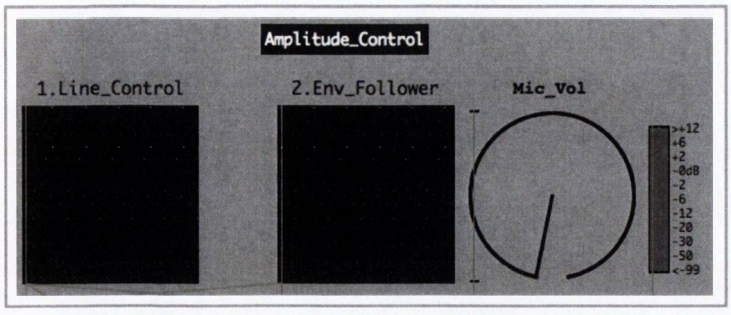
The user can selected four different durations to perform the patch over (3, 5, 7.5 and 10 minutes, which are highlighted in the above representation); duration selection is only essential is automative processes are being utilised.

Step 2 - Automated Pitch



The overall pitch of the infrasound can be controlled by the amplitude or the room being analysed by the microphone in the room; the infrasound is set to fluctuate between 19-20 Hz in accordance with the amplitude in the room. The toggle should be switched on to activate this process; or simply ignored.

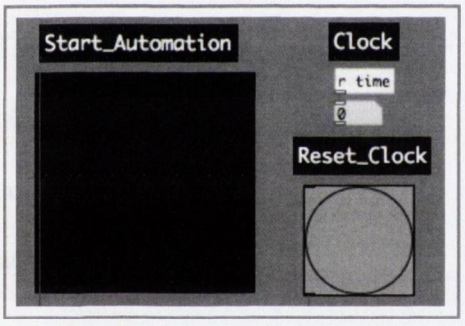
Step 3 - Amplitude Control



The microphone is used to measure the overall amplitude of the room, which can directly control the amplitude of the infrasound; i.e. The 'Env_Follower' toggle.

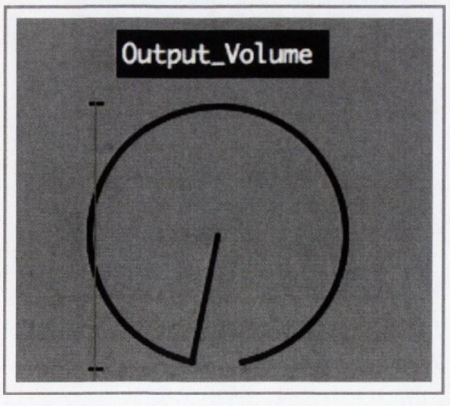
There is a choice between the amplitude to be controlled by the envelope follower, or line can be chosen to create an amplitude fade across the durations indicated; 3.00, 5.00, 7.30 and 10.00 minutes. If the Env_Follower option is selected, the user must set the volume of the microphone before initiating the process.

Step 4 - Start Automation



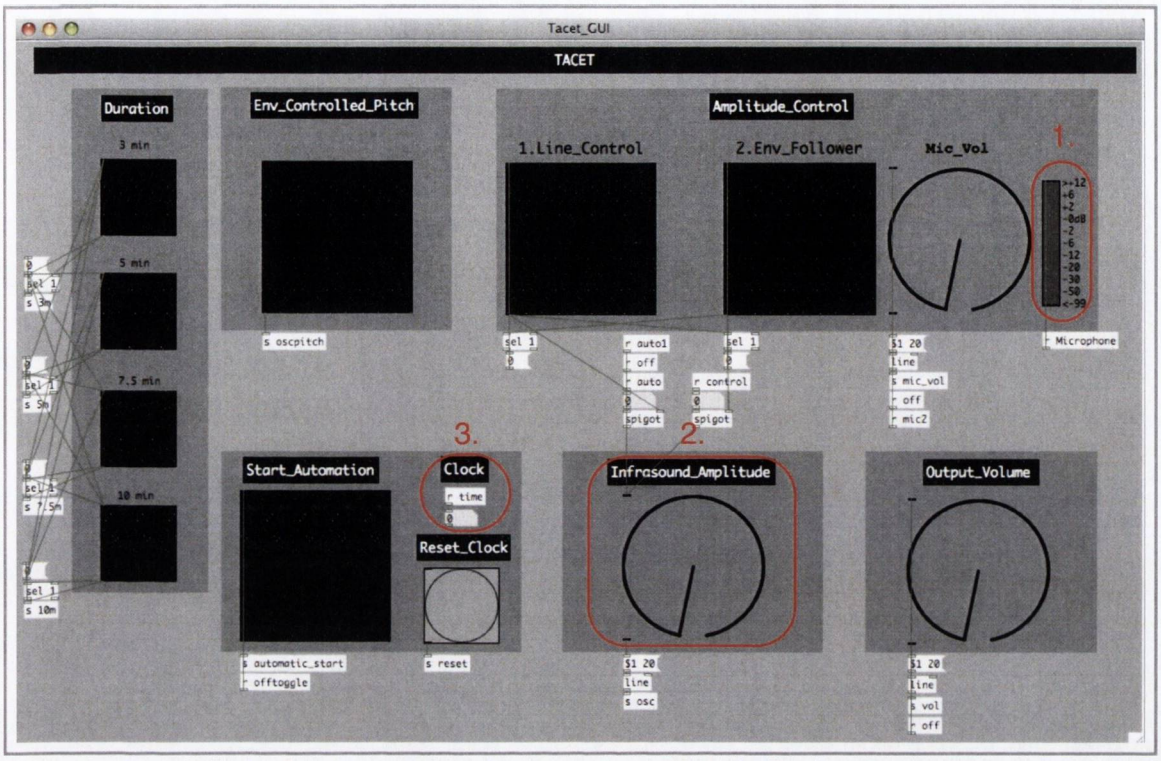
The toggle starts the automated clock on the patch, which commences the performance process.

Step 5 - Set Output Volume



It is recommended that the infrasound is tested at full volume before the 'Infrasound_Output_Volume' is finally set; the automation (or line option) in the patch finishes at maximum volume, so it is important for the overall level to be within the limits (or capability of the sub woofer.

Step 6 - Monitoring



The amplitude of the room microphone can be monitored in the VU meter included in Microphone_Vol (highlighted in number 1). Furthermore, Infrasound_Signals_Amplitude (if controlled by line) and the microphone volume gradually fade to maximum volume in accordance with the duration of the work (highlighted in number 2). This (along with the clock; in the start automation section) can be used as a durational indicator (highlighted in number 3).

Chapter Three

3.1. Hyperreal Sonic Images

The following discussion traces the insights gained through the creative practice. Initially, before focusing on phonography, a number of works developed from recorded sound by designing highly complex structures with semiotic foundations. This approach involved organising the disembodied[99] recorded sound into detailed formations that were controlled and articulated through editing, digital signal processing and sequencing techniques. Suggestive and metaphoric contexts unified otherwise disembodied recordings in composing the work. For example, the contextual frame used in '*Tidal Streams*' provides a link to the devised narrative explored (i.e. a sonic journey through the powerful tidal currents of the sea). Contrastingly, the depiction of the real-world in '*Everyday Mimesis; Grey Day*' manifests in an unaltered but highly composed form. In comparison, '*Tidal Streams*' and '*Everyday Mimesis; Grey Day*' have (sporadic) similar sound collection processes, although the subsequent organisational methodologies create contrasting sound fields. Location recording processes and the recording studio were both collectively applied as a kind of instrument for controlling and dealing with recorded sounds; at this stage of the investigation, phonography and sound design were thought as being part of the same process.

Coupled with the initial fixed media works, two collaborative projects enveloped with the dancer and choreographer Imogene Newland[100] and the visual artist Conan McIvor[101]. '*Tryst*' and '*PLAY*' were initially considered as being outside of the research areas being explored, and, in direct comparison to the other works, the visual elements involved, which manifests through the presence of the performer and the videography/filmography, mark these as distinctly separate from the other

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[99] The dis-embodied and dis-placed sounds have the potential to create acousmatic situations in which listeners, denied the visual cues that would verify the source of the sounds they hear, actively seek to identify the sound's source and place through imaginative aural inference. Imaginal Listening: a quaternary framework for listening to electroacoustic music and phenomena of sound-images, Sun-Jun Kim, Organised Sound.

[100] More information available at: <http://www.imogene-newland.co.uk/>.

[101] More information available at: <http://www.i-m.co/conanmcivor/conanmcivor/>.

works in the portfolio. On reflection, the investigation of contextual frameworks helped to steer the investigation towards a phonographic approach, with the focus of the creative work less concerned with abstract and/or metaphoric narrative or contexts. More significantly, '*Tryst*' and '*PLAY*' allowed the performance process to be considered from a different perspective to the fixed-media approaches explored. The performance of '*Tryst*' requires the space to be arranged with no seating, forcing the audience to choose from where to experience the work in the space. During the performance, members of the audience are able to engage dynamically with the performance space because it is possible to move position in order to gain the best vantage point of the performer, video and sound field. This strategy was in-keeping with the theme of the work (i.e. '*Tryst*'), and was adapted to a range of different performance spaces and situations. In the wider context of the themes explored through the portfolio, the performative elements explored through '*Tryst*' went some way to prompting the formation of '*Tacet*', which further explores arranging that act of performance in an non-traditional fashion through monitoring and amplifying infrasound.

In reviewing the three initial investigations (i.e. '*Tidal Streams*', '*Tryst*' and '*PLAY*'), inspiration for the musical language, narrative, and theme or context spawned from a range of diverse stimuli that resonated. It is possible to portray any theme, topic or concern in direct, abstract or even metaphoric expression[102] because disembodied recorded sound can be structured in an infinite number of scenarios. During the investigation, in the act of creating a work framed around a specific musical idea (i.e. context, theme, narrative or programme), the sound field became built around (or tailored to) the imagined discourse. This process provided a focus that was targeted throughout the inception process. In practice, this reflective approach can sometimes become

[102] "In the confusing, wide-open sound-world, composers need criteria for selecting sound materials and understanding structural relationships". Smalley, D. 'Space-Form and the Acousmatic Image', Organised sound, Volume 12, Issue 01, April 2007, pp 35-58. Availible at: <http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=971860>.

creatively restrictive because the discourse may not materialise as initially expected[103]. Contrastingly, compositional constructs can spawn from a set of sound objects or source recordings, allowing the context to be formed in parallel with the musical structure. This can allow for a context to spawn out of the organisation and experimentation process[104]. Inevitably, there will always be a certain amount of crossover between context-driven and source-led beginnings, as both processes eventually become scrutinised at some point during the compositional development. Furthermore, as the compositional process draws towards completion, the context and sound field should become inseparable.

The listening experience can be formally defined as being hyper-real[105], as the sound world encountered is built in the listener's imagination from the semiotic foundations (previously) arranged by the composer, however, the communicative process is only ever considered as being suggestive, as the listening process is always highly subjective to the individual, and therefore, the context or theme of a composition may not be interpreted in the same way as it was originally envisaged or set. Personal experiences of the listening process suggest that organised sound worlds can sometimes facilitate highly visceral encounters, causing a kind of mental (or imaginary) visualisation in the mind's eye[106]. The experience might not even involve a literal translation of the sound objects or even directly relate to what is transpiring in the context of the musical discourse. Rather, it is just stimulated and influenced by the encountered sound world in some way. The imaginative experience inevitably varies, but sometimes it can be like being suspended in a trance,

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[103] "Although spectromorphological ideas can help perceivers to focus on the imagination and craft of the composer, they will not help the composer to become more imaginative or to improve craft". Smalley, D. 'Space-Form and the Acousmatic Image', Organised sound, Volume 12, Issue 01, April 2007, pp 35-58. Availible at: <http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=971860>.

[104] It is useful to remember that the collection of sound objects can occur at any time over the formation period. This can be used to stimulate, generate or inspire further compositional development or momentum.

[105] Hyperrealism has its roots in the philosophy of Jean Baudrillard, "the simulation of something which never really existed". Baudrillard, J. 'Simulacra and Simulation', Ann Arbor Mich, University of Michigan Press, 1981.

[106] The phrase "mind's eye" refers to the human ability for visualisation, i.e. For the experiencing if visual mental imagery; in other words, one's ability to "See" things with the mind. The first recorded use of the term was in 1577 by Hubert Languet in a letter, which was subsequently printed in 'The correpondence of Sir Philip Sidney and Hubert Languet", (1845).

akin to day-dreaming. In saying that, my experiences of this listening process are extremely varied, which suggests (that in my listening vocabulary) there maybe a thin (hypothetical) line between gaining a visceral experience and simply recognising sounds or behaviours set in highly organised fashions[107]. Although it is possible to build works with high abstraction and symbology similar to programatic music (i.e. through narrative, context or thematic framing, metaphor or any other musical parameter), recorded sound allows direct reference to recognisable sounds and events. In forming an aesthetic, using recognisable (or mimetic) sound fields provides more opportunity for the listener to understand, realise and imagine the work, as the unfolding sounds are more easily recognisable and relevant[108]. Works that utilise abstract materials or constructs can create highly captivating listening experiences[109], but there can be a (personal) tendency to objectively break down the formal elements[110] from which the musical work is made, rather than getting lost in the overall experience[111], [112]. Composition that is primarily abstract in nature, where the sound object is objectively detached from the original source by the composer and listener, generally fails to stimulate or induce my imagination in the same way as a work that plays on the recognisability of

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[107] This is, of course, a highly subjective discussion, foremost led by my investigation into organised musical languages, something that developed over the course of the practical research, however, in defining 'Source Bonding', Denis Smalley also discusses this process: "Source bondings may be actual or imagined - in other words they can be constructs created by the listener; different listeners may share bondings when they listen to the same music but they may equally have different, individual, personalised bondings; the bondings may never have been envisaged by the composer and can occur in what might be considered the most abstract of works; wide-ranging bondings are inevitable in musics which are not primarily weighted towards fixed pitches and intervals. Bonding play is an inherent perceptual activity".

[108] This phenomenon has been discussed in length by a number of practitioners working in the realm of electroacoustic music, through differing perspectives, theories and terminology (Emmerson 1986; Wishart, 1986; Fischman, 2008; Sun-Jum Kim, 2010); in this vein, 'sound surrogacy' is a term coined by Denis Smalley, which is used to describe "the levels, or degrees, to which listeners perceptually relate sounds to real or imagined physical and gestural sources within an acousmatic listening situation". Smalley, D. 'The Listening imagination: Listening in the Acousmatic Era', Contemporary Music review, Vol 13, Issue 2 1996.

[109] N.B. To be clear, this is not a crusade against acousmatic music, far from it - acousmatic music has the ability to transport listeners to fantastical imaginal places. This preference was largely born out of the process of discovery which heavily involved composing with phonographic real-world sound in acousmatic listening environments.

[110] The embodiment of the work; This term is generally associated with visual arts, but here I consider using the term to describe the embodiment of a piece of music.

[111] i.e. what are the 'imagined causes' (Smalley, 1997) of the sound objects e.g. What is the origin of the source material? What digital signal processing technique has been used? What is the relationship or connection between the sounds used? What spatialisation techniques are being applied?, Smalley, D. 'The Listening imagination: Listening in the Acousmatic Era', Contemporary Music review, Vol 13, Issue 2, pg 78 1996.

[112] This is a highly subjective discussion, but can be typified by this "anything present in the final mix of the composition is composer-intended by definition, and any listener who wishes to determine if it was 'by design' then faces an abyss of interpretation around the black hole of intentionality". Parmar, R. 'The Garden of Adumbrations: Reimagining environmental composition', Organised Sound, Vol 17, Issue 03, Dec 2012, pp 202-210.

the sound sources. Rather than engaging my critical thinking, a work that plays with sound recognisability captivates my imagination. Moreover, it enables me to forget about the organisation of the sound world and allows me to succumb to the overall listening experience by encouraging imagining the place or causality of the sounds that the references or environments virtually create[113]. This listening experience encourages one to focus on (and succumb to) the environment that is created[114], rather than on the organisational characteristics of the sound world. Although there may be a number of reasons for this[115], my motivation became focused on working with and presenting familiar. It goes without saying, compositions that use recorded sound as a (musical) material can indeed be based entirely around the infinite possibilities that arise from using recognisable (mimetic) and abstract (aural) sound[116]. In my compositional approach, this has become less of an ideology and used more as a retrospective analysis tool for refining the communication of musical language. In some ways, over the course of the research it became more to find a place for abstract (or aural) sound objects in musical structures, because the level of complexity in the musical language sometimes became dumbfounding and confusing[117].

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[113] In this vein, Denis Smalley coins the term 'Technological Listening', which describes a listening mode amongst those with expertise in electroacoustic techniques. Technological listening occurs when a listener 'perceives the technology or technique behind the music rather than the music itself, perhaps to such an extent that true musical meaning is blocked. Smalley, D. 'Spectromorphology: Explaining Sound-shapes', Organised Sound Vol. 2, No. 2. Cambridge: Cambridge University Press.

[114] As Rui Chaves and Pedro Rebelo point out "In sound lies the potential for elsewhere and the possibility that even for just a few seconds a listener is transported into imagined worlds, in a process made up of memories and moods.", Chaves, R and Rebelo, P. 'Evocative Listening: Mediated Practices in Everyday Life', Organised Sound, Volume 17, Special Issue 03, Dec 2012, pp 216-222.

[115] "The manner in which listeners interpret music is influenced by the interplay of diverse parameters during the listening experience. These include personal background, and culture as well as mood, a capacity for memorisation, and a general level of interest during listening", 'Materials, Meaning and Metaphor: Unveiling Spatio-Temporal Pertinences in Acousmatic Music', Electroacoustic Music Studies Network 2007 Conference, De Montfort University, Leicester, UK, June 13, 2007.
Available at: <http://www.ems-network.org/IMG/pdf_AndersonEMS07.pdf>.

[116] My own work, '*Tidal Streams*' is testament to this, similarly Barry Truax's '*River Run*', "Even further along the continuum is the creation of a purely imaginary or virtual world, one that perhaps seems 'hyper-real' with recognisable elements and structure, yet logically impossible, and possibly interpretable as mythic". Truax, B. 'Sound, Listening and Place: The aesthetic dilemma', Organised Sound, Volume 17 Issue 3, Jan 2012, pg193-201.

[117] Or with nothing to related to, as Robin Parmar discusses, "Anything present in the final mix of the composition is composer-intended by definition, and any listener who wishes to determine if it was 'by design' then faces an abyss of interpretation around the black hole of intentionality". Parmar, R. 'The Garden of Adumbrations: Reimagining environmental composition', Organised Sound, Volume 17, Special Issue 03, Dec 2012, pp 202-210.

Putting this discussion in the context of the compositional timeline, the initial works were made by generating highly abstracted (or synthesised) sounds and sound-fields through improvisation, experimenting with complex digital signal processes and organisational processes in studio conditions and environments (e.g. '*Tidal Streams*', '*Tryst*', '*PLAY*', '*Tempest in a Teacup*', '*Tacet*'), but as the body of work developed, these kinds of processes were not as prevalent, as the focus developed the possibilities afforded through the recognisable (and suggestible) qualities of phonographic (real-world) sound[118]. A focus on phonography was not planned from the outset. Instead, it developed from the practical experience of working with sound in studio based environments, specifically with octophonic speaker and microphone arrays. This unplanned development changed the kinds of sound fields that were explored and this is evident in comparing '*Tidal Streams*', '*Tryst*' and '*PLAY*' with '*Everyday Mimesis; Grey Day*', '*Vivified*', '*Empire Drive*'. Towards the end of the research, in an attempt to bring the compositional approaches full circle, some of the extended phonographic processes that developed through the investigation were used to create highly organised sonic structures. '*Thoroughfares*' is testament to this, however, '*Tempest in a Teacup*' provides a better example of a musical language created from an extended recording technique and perspective. The compositional process investigated a sound world that would not, normally, be heard (i.e. four custom built hydrophones were used to document the natural process of ice freezing and melting). Through juxtaposing the context of a natural process (i.e. freezing and melting ice) and using direct (phonographic) references to the recording of the source (in highly exaggerated fashions), the subsequent sound world explores materials that can be immediate and encourage source bonding processes.

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[118] As Trevor Wishart points out, "In order to build up a complex metaphoric network we need to establish a set of metaphoric primitives which the listener might reasonably be expected to recognise and relate to, just as in the structure of a myth we need to use symbols which are reasonably unambiguous to a large number of people". Wishart, T. 'Sounds Symbols and Landscapes', The Language of Electroacoustic Music, Macmillan, 1986.

3.2. *'Tidal Streams'*

'Tidal Streams' is a stereo fixed media composition that aims to provoke mental imagery of a journey through the powerful tidal currents of the sea[119]. The oceans tides produce oscillating currents known as tidal streams, the strength and direction of which varies according to the state of the rising and lowering tide. The impressionistic sonic-image explored in *'Tidal Streams'* uses the notion of this natural phenomena to generate imagery in the listener's imagination, derived from experiencing and interpreting the organised sonic landscape and the formulated context of the work. The sonic representation of the sea applied in *'Tidal Streams'* is highly metaphorical and fictional, and therefore can only really be thought of as being suggestive, at best. In this vein, the title *'Tidal Streams'* was thought to be the most effective way of creating the context for the sonic-image explored through the compositional work, as it suggests a hypothetical frame through which the listener can best perceive the composition. In attempting to influence the interpretation and harness the power of suggestion before the listener experiences the work, the programme notes outline the composition is a sonic journey through the powerful tidal currents of the sea which solely attempts to strengthen the suggestive nature of the work.

At the outset of the composition process the main objective, to explore the process of generating programatic musical discourse, involved dealing with the subsequent presentation of the imagery portrayed through using (mimetic-aural) recorded sound in fixed media composition. Inspiration for *'Tidal Streams'* came from a number of sources, but initially the thematic context and title were not part of the creative process, as the composition was spawned from experimenting with various recordings of water. Throughout the compositional process the sonic representation of the sea was simply inspired by the notion of being submerged in water imagining a variety of situations. This was realised through continuous reflection on compositional development during the inception

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[119] Tidal Stream: A tidal stream is a horizontal movement of water, in which the speed and direction may vary frequently and regularly according to the state of the rising and lowering tides.

process. The programatic theme and title *'Tidal Streams'* was not formalised until the composition was well underway and sometimes these things (conceptual and perceptual) form alongside each other. Generating the composition without strict contextual bounds allowed the materials to form organically through improvisation, the results of which were tailored and enhanced through the formalisation of the context. Informal listening sessions became a crucial part of the composition's evolution process because these informed and strengthened conceptual framework. This reviewing process is akin to mastering, which is generally associated with the post-production of audio. Depending on the context, the definition of mastering can involve any number of processes for developing the overall quality of the mix, but historically this generally refers to the act of transferring recorded audio from a source containing the final mix to a form of data storage (e.g. rom computer to an audio file or compact disc). In terms of improving the audio quality, mastering involves creating the best possible final mix to be consistent over a range of audio playback equipment, for example, altering the equalisation of individual voices or parts. In the realms of mastering a fixed media work and in the context of the approaches explored, it was important to consider the projected sound world and the context as a whole, surveying the experiential impact of the sound and context during each listening session. These listening sessions can occur in a range of environments and with a host of different equipment, in order to help the engineer develop a mix that has been considered on different types of audio playback systems (i.e. over headphones or in studio conditions).

The recording and sound collection process influenced the shape of the composition. Moreover, as sound-objects were recorded the structure developed from the ensuring discourse that these sound-objects produced. The recordings used to create *'Tidal Streams'* were taken from rivers, weirs, the kitchen sink, a bathtub, the sea using a range of recording techniques including custom-built hydrophones for under water sounds (and perspectives). The generation and organisation period of the composition was treated as an experimental process that involved collecting and surveying

source material (e.g. organising the sound files, cherry picking sound objects, editing, manipulating them through digital signal processing techniques and sequencing in the timeline). The sonic impression uses different layers to portray a sense of depth in the sound field. Dense textures mask more detailed sounds derived from the harmonically and gesturally synthesised recordings of water. Even though some of the sound world hints at water (i.e. waves or the sea), it is almost masked under the cacophony of the synthesied (metaphoric) sound.

The tonality of *'Tidal Streams'* formed as the digital signal processing experiments produced interesting harmonic materials that felt convincing and appropriate for the musical discourse. The source material has been treated and manipulated using a variety of digital signal processing techniques that abstracted the source material. This process obscured the origins of some of the source material sometimes so that it is unrecognisable. For example, the resonant pitches featured throughout the work were primarily created through comb and band pass filters, which were initially used to create harmonically altered (or restricted) impressions of the source material. The tonality that is created is most prominent in the opening and closing sections of the work, and the most dominant tone is F# (moving through three octaves i.e. F#2, F#3, F#4); the opening section works as a kind of prologue, and the tonality is called upon to close the work as a kind of (coda or) resolution to the sonic-image. Treated source material, particularly recordings of the sea has been used to create a drone like texture, generated by the harmonically treated water-based source recordings. As the drone texture gradually develops, other tones (C#2 and B2) undulate from the F#-based tones and gestures, which shift the overall tonality of the drone. Moreover, close proximity pitches (or clustered notes) are introduced subtly, e.g. frequencies between 370 Hz (F#4) to 349 Hz (F4) or 277 Hz (C#4) to 294 Hz (D4), to augment and dilute the purity of the (previously pure) frequencies and thicken the overall texture.

'Tidal Streams' was conceived in three main sections, which are briefly outlined here; the opening section of the work acts as a kind of prologue, which endeavours to simulate the metaphoric water filling the performance space. At the Sonic Lab, at Queen's University, Belfast, the performance started the diffusion at the top of the multi-leveled speaker array, gradually increasing the amplitude of the lower speaker configurations to give the impression of water cascading down to the listeners on the floor-level, as the sound begins to envelop the performance space. The opening section of the work (0.00' - 2.28'), the metaphonic water filling up the (acoustic) space, consists of resonant tones, that gradually grow and encompass the listening space. The resonant tones climax and come to an abrupt end (at 2.28'), throwing the listening into a tranquil, still and peaceful sound world. After the dramatic climax this fragile and delicate sound world seeks to emulate the sensation of floating, like being suspended and weightless surrounded by water. The middle section of the composition attempts to take the listener on the twists and turns of am imaginary tidal stream (5.52' - 6.50'). The subtle gestures made from the abstracted sound of waves are masked by a dense texture, that attempts to represent the complex twists and turns contained within the synthetic tidal stream. The final section of the composition (6.50' - 10.00') acts almost as a coda, and is understood as the calm after the storm; where a sense of tranquility resolves the previous chaotic scenes. It also acts as a reference to the opening section, which ultimately attempts to signify the listener emerging from the water, and back to some form of reality.

The programatic nature of *'Tidal Streams'* does not guarantee the listener will latch onto the suggested narrative of a powerful journey through powerful tidal streams. The listener is simply invited into creating their own imaginary sonic-image journey in response to the sub-aquatic materials contextualised through the liquid based sonic-image. Ideally, this interpretive process will be nurtured as the programme notes suggest imagining an underwater journey. Whilst the average listener may or may not have knowledge of what is a tidal stream, most people may be aware of this natural phenomena, however it is not necessarily essential for the listening experience. Any kind of

reference to the personal narrative that was imagined or devised to accompany the composition is omitted from listeners, to increase the associative and suggestive possibilities of the impressionistic work. The imagined and thought-led process of forming my own associations with the sonic-image played a crucial role in forming the composition, however, my interpretation (and narrative stimulus) is concealed from listeners. The composition attempts to invoke a narrative that is unique to each listener and divulging my own narrative may affect the way others interpret the composition's discourse. Further, rendering the associative (and source-bonding) intentions void before the composition is even experienced. In essence, it would almost take the mystery and experiential impact away from the listening process.

'Tidal Streams' was written as a stereo composition, but can be diffused over any number of loudspeakers in performance. The most notable was diffused at the Australian Computer Music Conference 2010, which required specific instruction on my diffusion methods for the work (this information is included in the appendix).

3.3. *'Tryst'*

'Tryst' is an interdisciplinary collaboration project that explores (from a compositional perspective) extending the immediate environment of a contemporary dance performance through pre-recorded samples, real-time amplification and digital signal processing. From a physical perspective, the piece stands as a commentary on the importance of gesture as a choreographic device in the context of Western classical piano performance, and seeks to deconstruct the sociological strictures of classical culture while at the same time providing the philosophical stance of performance as a mode of seduction. Within this, the relationships humans form with objects are used as a metaphor for desire in which the inner conflicts of the performer are revealed[120]. Although there is an immediate emphasis on the physical aspect of the work through the contextual setting, in performance the collaborative work marries the three disciplines (i.e. movement or dance, film and sound), and therefore in analysis, the work may be discussed through the individual parts or disciplines. The discussion here focuses on the aural elements of the collaborative work.

In the chronological timeline of the body of work, at the outset of the exploration there was not necessarily a planned research path determined, so when Imogene Newland brought up the idea for the work it was thought that the work would not relate to the compositional research being pursued. In direct comparison with *'Tidal Streams'* (the first work created), the kinds of musical gestures exploited are highly contrasting, as in the sound world of *'Tidal Streams'* the sonic connections are made in the listeners imagination. In comparison, the sound world featured through *'Tryst'* provides a more immediate connection to the kinds of sounds used, as they are all visually apparent (i.e. the performer and the piano). Although it maybe difficult for listeners to discern the source of some of the sampled sounds, the origins and characteristics of the sound objects are always tied to the sound of the performer and the piano, allowing the listener to make connections between the sounds and movement performed. Furthermore, through exploring a different kind of source sound, a

[120] Newland, McIvor and Bird: 2009.

contrasting compositional methodology was explored.

It is clear that the performer, Imogene Newland, is exploring her own research themes and ideas through the collaborative work (choreography and performance aesthetics)[121], and it is safe to say I had no direct input on specific movements created and performed by the dancer. However, the work is still thought to be interdisciplinary as the overall structure of the work was shaped and formed over time, through formalising the structure of the music and dance in a collaborative manor. In this respect, there was a mutual respect[122] between the performer, videographer and myself during the conception of the work. Ultimately, I have no expertise in contemporary dance, but it was easy to study and take inspiration from the types of movement and intensity generated by the performer. From this experience, during the creation and evolution period of the collaborative work, the dance and music were worked on separately, and tested in practice and rehearsal sessions. This allowed the structure of the work to become formalised through repeated review in a highly collaborative manor. Over time, the sonic landscape was tailored to display a narrative that accentuates Imogene Newland's thematic context and approach, and does so in highly metaphoric fashion. The organised sound world attempts to give the piano its own voice in the composition (or tryst), as the performer wakes the sleeping voice (or instrument), it gradually starts to resonate off its own accord, building up to an inescapable level of volume as the tryst grows and unfolds. The organised sound explored in *'Tryst'* uses a mixture of natural and amplified sound, which is subtly juxtaposed and manipulated with digital signal processing in real time. This is coupled with pre recorded samples (of the performer) that are triggered in correlation with the performers (queues)

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[121] "The piece stands as a commentary on the importance of gesture as a choreographic device in the context of Western classical piano performance. It seeks to deconstruct the sociological strictures of classical culture while at the same time providing the philosophical stance of performance as a mode of seduction. Within this, the relationships humans form with objects are used as a metaphor for desire in which the inner conflicts of the performer are revealed", Imogene Newland, Conan McIvor and David Bird: 2009.

[122] "For a real relationship to develop there is a need for each artist in a collaboration to understand the inherent 'crossover' nature of each art independently: the visual as suggested by the aural alone and vie versa. This will involve experimenting and working together with mutual respect, accentuating the craft of the work over the romantic egotism of its 'art'. Emmerson, S. 'Aural Landscape, Musical Space', Organised Sound, Volume 3, Issue 02, Aug 1998, pg 135-140.

movements and actions. The main objective behind the organised sound world was to try and capture and amplify the close relationship the pianist has with a piano, whilst enhancing the overall impact of the performers movement through amplifying the movements. The resultant sound world attempts to magnify the sound of the performer interacting with the piano, which magnifies the at times highly intimate movements and sounds. This creates an quasi-voyeuristic scene, as the audience is allowed to observe the pair become involved in a passionate fight; hence the title, *'Tryst'*.

The sound world was created by using a number of compositional devices, resonance is subtly exploited in the organised sound world, as the sounding body of the piano is amplified from the resonant acoustic chamber, e.g. two AKG 414 microphones are laid flat on the sounding board of the piano, the foam inlay of the microphones box was used avoid unwanted artefacts and to secure the position of the microphone on the beam of the sound board (i.e. the patch uses a high pass filter, to avoid feedback through the amplified sound). This is also coupled with the piano pedal being held down, which allows the sound of the performers movement to resonate inside of the piano. The microphones placed on the sounding board pick up and amplify this sound, creating a subtle ambience throughout the performance. This is most noticeable in the opening sections of the work where there is no sampled sound. In this section, the focus is towards the sound of the performers movements in the space, which becomes musically heightened through the amplified resonance taken from inside of the piano. Resonance also plays a large part in the sampled material that is triggered live, as granular synthesis was used (TGrains[123], a Supercollider[124] unit-generator) to create the pulsating tonal drones and textural passages featured in the work. These initially act like a backdrop to the un-amplified (and amplified) sound of the performer.

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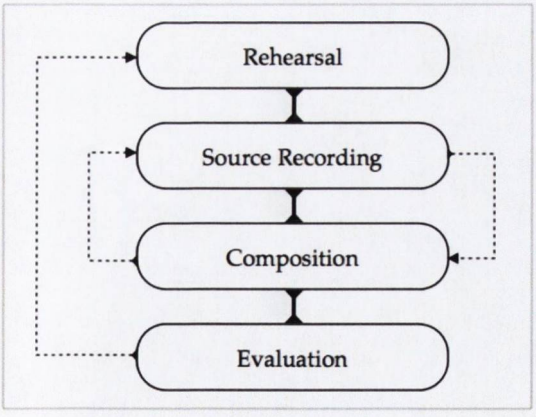
[123] Daniel Nouri, D, "TGrains", Supercollider UGen.
Available at: <http://danielnouri.org/docs/SuperColliderHelp/UGens/Playback%20and%20Recording/TGrains.html>.

[124] McCartney, J. "Supercollider", Script Based Programming Language.
Available at: <http://supercollider.sourceforge.net/>.

The creative process was initialised through improvisation sessions, in which the dancers movement was studied and recorded in practice and rehearsal settings. Over time, loose patterns of movement were devised by the performer, which were used as inspiration for forming the structure of the musical accompaniment. The performer (Imogene Newland) is critical to this work, aurally as well as visually, which is contrasting to other forms of dance, such as ballet, as the sound of the dancer or performer is not readily heard. '*Tryst*' magnifies the movement and interaction with physical the objects in the performance space (i.e. floor, staging and the piano) which heightens the sonic characteristics of the performance; for example, the highly demanding movements exerted in performance causes the performer to breath deeply, which in itself became a feature as the work unfolds. As a result, the audience can hear every minute sound made as a consequence of the performers interaction with the space and piano. In essence, the organised timeline created by the sound world attempts to evoke nondescript themes and metaphors linked to the context of the work through the sounding material. For example, the piano coming to life during the performance and the performers highly intimate relationship with the piano.

Figure 20. Tryst: Compositional Process



This simple diagram outlines the stages of forming and structuring of the work. Rehearsals were used as generation period, which involved recording the sound of the performers movement. This was subsequently organised (and processed) away from the rehearsal space. Ideas and themes were devised out of these compositional sketches and went on to form the final structure of the work.

The quadraphonic sound-field is performed and controlled using a pure data patch, which requires the controller to trigger (bangs and buttons) on pre-devised visual cues given by the performer. Apart from the written directions on the patch, no formal score exists for the musical or physical movement aspects of this performance. Therefore, *'Tryst'* requires an understanding between the

musical controller and performer during the act of performance. Although there is an overall structure to the performer's actions, sections of the work remain largely improvised, and can appear slightly different in each performance. With this in mind, in-keeping with the improvisatory nature of the overall approach, the pd patch has built-in time buffers, allowing more time (never less) in the relevant sections of the work[125]. For example, the patch allows the user to trigger samples twice, without affecting the forthcoming section or 'cue' in the graphic user interface of the patch (i.e. programmed amplitude fades then automatically take care of any unwanted samples triggering the sample twice may cause). The collaborative work may be performed by any performer or controller, but the performance does require a certain amount of rehearsal time before performance, which is a result of the improvisatory nature of the dancer's movement. Therefore, the dancer and musical controller have to be familiar with the loose structure of the work, before it is performed, which would require prior study and rehearsal.

Although studying the movements of the performer is key to performing the work, the following descriptions outlines some of the key movements (or moments) used as cues to perform the work. In the opening section, the un-amplified sound of the performer is the only aural stimulus, which attempts to draw attention to the reality of the space. As the work evolves and the movement of the performer becomes more lively and energetic, the natural sound world becomes juxtaposed with an amplified projection of the dancer's movement and interaction with the space. The gradual introduction attempts to subtly augment and extend the performers movement and interaction with the piano. The performer's actions become more accented through the projected sound, which is typified by the performer slamming down the piano lid (cue 1.1) which subsequently creates a resonance. Here, the frequency spectrum of the resonance (born out of the slammed lid) is frozen (using freeverb~[126]), resulting in a suspended tonal drone. The drone is subsequently pitch shifted

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[125] The visual cues are indicated inside of the pure data patch, which are indicated in 'Figure 24'.

[126] Steiner, HC. "freeverb~", pure data object.
Available at: <http://puredata.info/downloads/freeverb>.

downwards whilst gradually fading to nothing in accordance with the performers movement to the following section of the work. Thereafter, the following sections of the work are highly dependant on the pre-recorded samples, as they accentuate certain actions and provide an indication of duration to the performer. This process is heavily used in the closing section of the work, where the sound of a slamming piano has been looped (using groove~[127]), creating a highly repetitive rhythm. The sample starts extremely quietly, and gradually grows until it dominates the sounding environment. The intense repetitive attacking sound attempts to signify the physical (almost sexual) relationship between the performer and the piano. During the onset of the sample, the performer makes her way into the predetermined finishing position; which is (headstand like) on top of the piano lid. This position is frozen until the (looped) attacking sample comes to a climax, and abruptly stops. This is at high volume, to the extent the repetitive rhythm resonates the acoustic chamber inside of the piano. As the sound abruptly stops, the amplified resonance from inside the piano is left ringing, which is coupled with the sound of the panting performer..

In performance the work experiments with the positioning of the audience in the performance space, as there are no chairs or outlined positions for the audience members to take, causing a decision on the vantage point to be made upon entering the performance space. This also means that the audience members can move during the performance to gain a better position for experiencing the work. In essence, this act attempts to add to the voyeuristic characteristics of the work, causing the audience member to decide where the best possible position would be to experience the dynamic movement of the performer. In terms of sound diffusion, as the work is quadraphonic the best possible position would be as central as possible, although the focus from the visual to aural domain is gradual, so during the experience it is possible to shift ones focus from one domain to the other.

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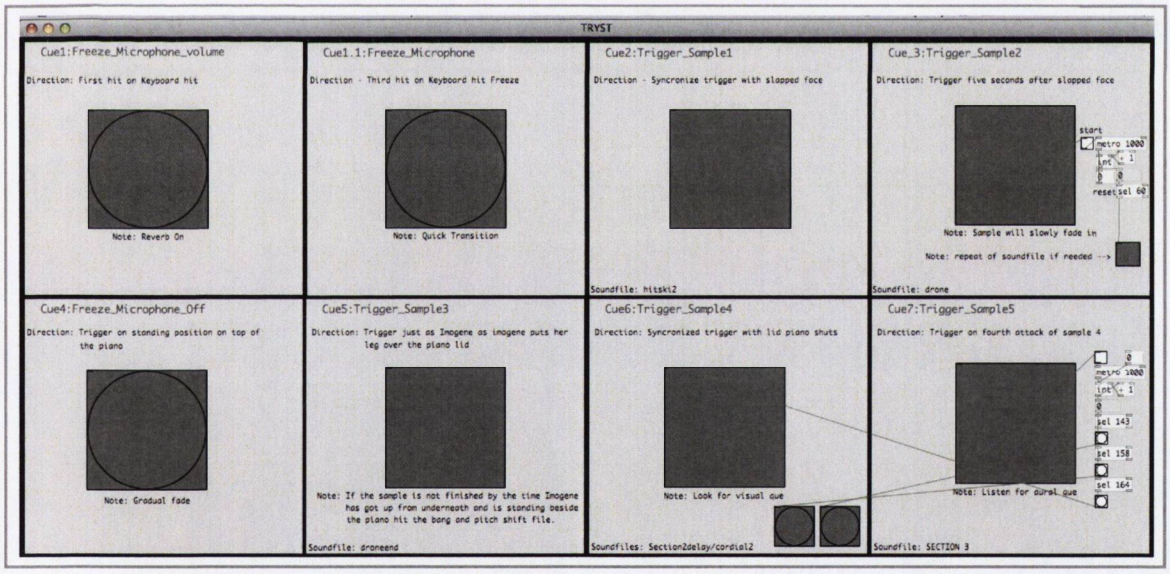
[127] "loop~", Max MSP object, Variable-rate looping sample playback.
Available at: <http://www.cycling74.com/docs/max5/refpages/msp-ref/groove~.html>.

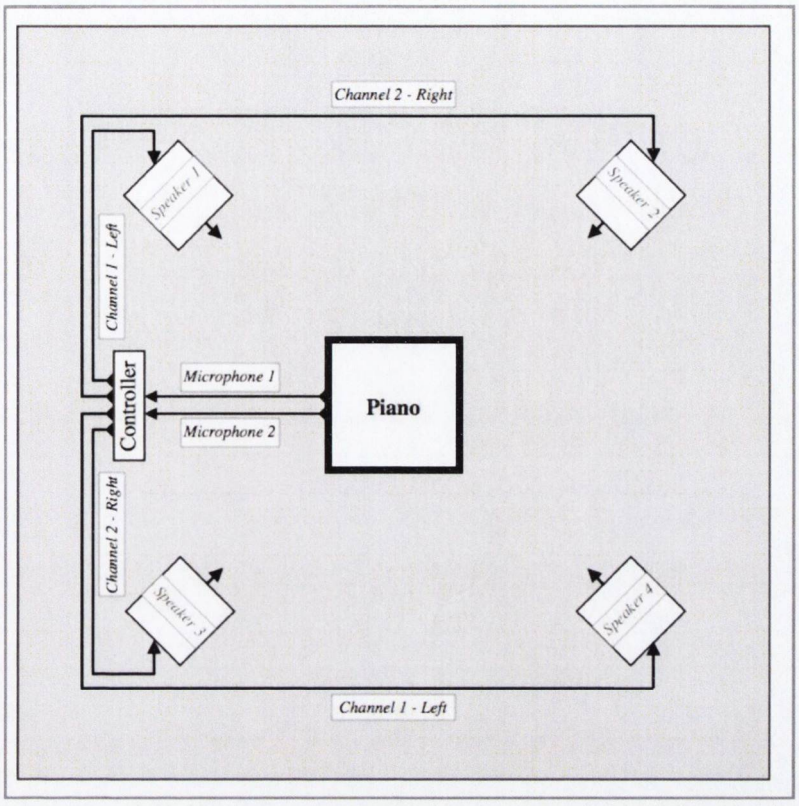
'*Tryst*' has an optimal performance set up, which requires the piano to be in the centre of the space (please see Figure 23), with the quadraphonic speaker array positioned in four corners around the piano. However, in performing the work at a number of different venues, this set up was tailored to each performance space, for example, the performance in the Sonic Lab at Queen's University, Belfast did not allow for the piano to be positioned in the centre of the performance space, as the mixing desk is hard wired into that position and the piano is generally kept towards the front of the space (on the staging). In this scenario, the performer and piano were positioned at the front of the space, with the controller located at the side of the staging. Although there was a mixing desk in the center of the space, this was the only physical object in the space provided for the audience, meaning they could move freely before and during the performance in the space.

Figure 21. '*Tryst*': Graphic User Interface



This image is of the graphic user interface used to control the patch. Each cue has a direction that the musical controller should follow. The directions indicate when the cue should be triggered (using the bangs and toggles) in relation to the performers visual cues. The notes attempt to describe the processes carried out by triggering the cue.

Figure 22. '*Tryst*': Optimum Performance Layout



The blueprint outlines the ideal performance scenario for 'Tryst', which was used in the first performance of the work in the Sonic Lab, at the Sonic Arts Research Centre. The grey area covering the blueprint highlights the space available to audience members, which can be used to gain the best possible vantage point at any one time. Although this setup is optimum, 'Tryst' is highly flexible and can be tailored to any kind of environment with a piano and access to four loudspeakers.

Figure 23. '*Tryst*': Cue Breakdown

Cue No.	Direction (Visual)	Action (Description)	Note
1	First hit on keyboard	Gradual amplitude fade	Reverb on
1.1	Trigger on third keyboard hit	Freeze spectrum	Quick transition
2	Synchronise trigger with performer slapping face	Trigger sample 1	Quick transition
3	Trigger five seconds after Cue 2/ slapped face	Trigger sample 2 - Gradual amplitude fade on drone texture	If section is taking longer than anticipated, re-trigger sample with the provided toggle
4	Trigger on standing position on top of the piano frame	Freeze spectrum off	Gradual fade
5	Trigger just as the performer puts her leg over the piano lid	Trigger sample 3	If the sample is not finished by the time the performer is out from underneath the piano, use pitch-shift and amplitude control to dissipate the sound
6	Synchronise trigger with the shutting of the piano lid	Trigger sample 4	Look for visual cue
7	Trigger on fourth attack of sample 4	Trigger sample 5	Listen for aural cue

This table outlines the information given to the musical controller on the graphic user interface

3.4. *'PLAY'*

'PLAY' was instigated by Imogene Newland, who conceived the initial idea of exploring the notion of reaching a 'desired state' through "the relation between the female body and the piano"[128]. During compositional approach taken during the creation of the work, the desired state was used and thought of as a contextual setting, foremost applied to imply the idea of the desired state on to listeners through the sound world created rather than focusing on or exploring the desired state of a performer. In this vein, the musical discourse explored in *'PLAY'* can be understood as an investigation into structuring, organising and articulating (or re-animating) recorded improvisation. The structured improvisation is brought to life through the organisation and composition process, which was foremost led by aural means. The overriding goal of the compositional process involved translating and realising the performers concept and theme through an organised musical language. This topic and theme is related to Imogene Newland's approach and research, and is clearly far removed from the other compositional research explored through the portfolio of works presented[129], however, the compositional processes explored are not too far removed from the approaches explored in the other work, as a range of source material was gathered, selected and structurally set into a form of musical discourse. The interdisciplinary enterprise is used by each of the parties involved (i.e. the performer, videographer and composer) as a vessel to investigate and explore themes related to each discipline. As a consequence, the discussion here centers around the compositional process and how the notion of reaching (and passing on the idea of) a desired state was applied.

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[128] "I understand the 'desired state' to be a total embodied moment in which the subject 'loses' her/himself through their relation and experience of a specific object. [...] I believe the 'desired state' is the state where the musician momentarily forgets her/his sense of self and experiences the illusion of being 'at one' with their instrument. I think the 'desired state' is an embodied moment in which the musician is no longer concerned with either the minute details of the performance, or their overall effect, but rather ceases to think altogether in a conscious manner about what it is they are doing. The 'desired state', in my experience, therefore results in a change of awareness in the subject that results in a feeling of oneness between body and instrument" (Imogene Newland, 2011).

[129] In actual fact, the direct influence of this theme on the overall compositional process was rather minimal, and to this end, the discussion on the thematic setting from the perspective of the performer is largely avoided. The discussion in the commentary here focuses on the musical aspects of the film, specifically on how the sound field came into being.

The representations of the performer in the film are fabricated from two different recording sessions, firstly footage was taken of the pianist playing selected contemporary piano repertoire[130], and secondly, a choreographed dance away from the piano recorded at a separate time which is ultimately designed to express different states of 'play'[131]. This process was devised and recorded by Imogene Newland and filmed by Conan McIvor with the main aim of capturing and almost simulating the pianist in the throes of a piece, or what has been been described as the 'desired state'. The musical discourse is solely derived from recordings of Imogene Newland improvising on the piano[132], where approximately 15 minutes worth of recordings were used (included on the DVD appendix). The final sound track was foremost devised and developed aurally in direct response to the recorded improvisations made by the performer, and from this, the formed musical discourse attempts to provide an analogy for the constant process of generating musical ideas which never develop. Musical ideas are sporadically explored in the discourse of the structured improvisation, which seeks to represent (metaphorically) the pianist searching for an idea. This is thought as being a loose metaphor for the process of composition (and choreography), which quite often uncovers ideas and themes that never develop and are forgotten, more often than not.

In the context of the sound world explored, the initial musical language consists of sporadic motifs that are derived from different sections of the recorded piano improvisation. The gestural motives were selected aurally and configured by juxtaposing contrasting themes (or motifs). As the work unfolds, a tonal resolution and repeated theme becomes apparent, which makes the organised (or composed) nature of the musical discourse more obvious. The most obvious arranged or composed feature of the work is the piano resonance (or drone), which was created through using granular

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[130] The footage of the contemporary repertoire is solely used for the visual element of the work; the repertoire selected includes Erik Satie's "Trois Gnoissiennes" (1893), which produced regular, circular torso movements and "Ondine" from Maurice Ravel's "Gaspard de la Nuit" (1908), producing a more erratic and irregular bodily participation (Imogene Newland, 2011).

[131] Imogene Newland describes the process of recording the improvisation on the piano: "In this approach I attempted to detach myself from any notion of a preconceived sonic intent, but rather attempted to follow my physical intuition. Through this method I felt as if I were letting go from the "trying-to-be" of my being a pianist and literally "lost myself" within the physical experience of playing" (Newland, 2011).

[132] The improvisation sessions were used to create the soundtrack to the film, but never featured visually.

synthesis[133]. This process creates subtle textures and rhythmic patterns which form a backdrop to the repeated gestural motif. In a similar vein, reverb[134] was used to thicken and blur the clarity of the gestural motif, which subsequently coincides with the unfocused characteristics of the film. Throughout the work's discourse there is an intentional non-interaction between the performer's movement (diegetic sound) and the organised sound (non-diegetic sound) derived from the piano improvisation. Evidence of this is in the opening sonic motifs that do not match to the movement of the performer creating a unique discourse between the visual and the aural domains. This non-diegesis was used to detach the "perceptual state" (Imogene Newland, 2009) of the performer, "where what is experienced and/or perceived and what is visible to the spectator is significantly different[135]".

The formalisation of structure was collaborative in nature, but principally led through the language of the sound world created in response to organising the improvisation recording. The composition process was an individual task that was performed and displayed for review with the other collaborators. This process foremost involved a dialogue and understanding between the filmmaker (Connan McIvor) and myself, as the film became structured through continued review and reflection. Initially, the film editing was shaped around a draft version of the organised sonic material and formalised through evaluation and further (collective) review. This reflective process is a continuation on the improvisatory theme explored in '*Tryst*', which was initiated by the improvisatory nature of the source recordings, and furthered through the quasi-improvisatory structuring of the final sound world. The compositional process heavily involved reviewing, dissecting, organising and setting the improvised recording to form an assembled version of the events that took place. At the beginning, it is perhaps not obvious that the sound of the piano is so

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[133] Daniel Nouri, D, "TGrains", Supercollider UGen.
Available at: <http://danielnouri.org/docs/SuperColliderHelp/UGens/Playback%20and%20Recording/TGrains.html>.

[134] Steiner, HC. "freeverb~", pure data object.
Available at: <http://puredata.info/downloads/freeverb>.

[135] Imogene Newland, Conan McIvor and David Bird, 2009.

strictly organised, mainly because of the discordant and improvisatory nature of the sound world. The source recordings would probably have to be reviewed to fully understand how the composition has been structured.

Putting this work into the context of the other compositions presented, the contextual framework presented foremost required the compositional process to realise someone else's creative vision. It was perhaps difficult to understand and realise the themes discussed with Imogene Newland at the beginnings of the work, however, through becoming familiar with her practices and outlook, my own understanding of her work developed. This process also encouraged me to question the use of abstraction the creative work. In many ways, '*PLAY*' (and '*Tryst*') signify a pivotal point in the development of the creative practice because they contributed towards the shift in focus to phonographic methodologies and practices.

Figure 24. Detailed Description of *'PLAY'*

The film opens with close-ups of the pianist's hands, first on their own and then in relation to the keyboard of the piano. The scenes establish notions of the haptic in varying degrees, beginning with the anticipation of touch between hands and keyboard and then the 'light' touch of contact before producing sound. The fingers appear to explore the surface of the keys and sound gradually emerges from this 'playing' of touch as incidental to the movement. As the sonic aspect of the piano becomes more audible, the camera focuses on the minute muscle movements in the body of the pianist generated in playing. Extreme close-ups of muscular movement within the forearms is contrasted with the wider perspective of the player's face and shoulders and the hands in contact with the keyboard. The sonic aspect of 'playing' is allowed to build onto a tonic resolution where the camera's gaze was intended to become more explicitly voyeuristic. The camera's lens is guided up and down the torso of the now visibly female protagonist, at which point a sudden spasm of movement is accompanied by a change in lighting state, illuminating the player's exposed skin at

chest level (8.16). The change in lighting state was used to attempt to sensualise the performer's body by making it appear as if oiled. With this the gestures of the pianist become gradually larger, which is matched with a climaxing passage in the (now largely tonal) musical accompaniment. The transition is further emphasised by the introduction of pink light onto the skin of the performer, which begins in the opening close-ups of muscle movement and becomes more prominent as the gestures of the performer increase (5.57 onwards). The coloured lighting gradually overwhelms the image of the performer until the screen is emblazoned with white light, completely and momentarily obscuring the view of the performer altogether (10.32 - 10.44). The climactic energy of the musical material dissipates at this point and resolves in a series of images where the pianist is seen to be moving, or rather 'playing' with movement through a pink lens, punctuated each time by a black screen (12.18 - 12.58). The image opens out to include the pianist's body and the piano, showing once again the context of the event, before the performer is seen to withdraw the hands, stand, and walk away from the piano (12.58 - 13.25). The performer/piano scenario is interjected by images of the pianist dancing or rather 'playing' in a movement context without the piano. The movement material, in keeping with the opening improvisation of the piano, is designed to express a state of 'play'. That these two elements are consistently contrasted throughout the film work eludes to the notion that piano play and dance play bear, in my opinion, significant relation both in terms of methodological approach and in the nature of bodily origin (Imogene Newland, Conan McIvor and David Bird 2009).

3.5. *'Tempest in a Teacup'*

The octophonic fixed media composition *'Tempest in a Teacup'* is formed from a set of recordings that attempt to capture the sonic process of water freezing and defrosting. The title *'Tempest in a Teacup'* is utilised to imply the idea of taking a small event and exaggerating it out of proportion, which is a direct reference to the way in which the source material was recorded (i.e. capturing small events) and utilised in the composition process (i.e. exaggerated out of proportion). The composition does not attempt to create a factual representation of this manufactured process, rather it presents a highly artistic and animated representation of the documented events, that have been subsequently set in a highly organised fashion. The idea for *'Tempest in a Teacup'* was initially conceived whilst undertaking a residency at Centro Mexicano para la Mùsica y las Artes Sonoras (CMMAS), in Morelia, during 2010[136]. For large parts of my month long stay, I spent quite a bit of time in the accommodation which was located in the suburbs of the City. During this time I became extremely aware of the sound of my surroundings, and subsequently fascinated by the sound of the fridge freezer which generated a mechanical drone that would intermittently manifest with different tones and at volumes. This curiosity was furthered and heightened through attempts to record the generated sound of the fridge freezer. The most interesting set of recordings were made through using hydrophones inside containers (small enough to fit inside a standard fridge freezer) of water, which gave rise to the basic idea behind the composition *'Tempest in a Teacup'*. Although the initial inspiration for the work was conceived in Mexico, the majority of the composition was generated and formed after the residency, in Belfast. The process of recording water freezing and defrosting was repeated with custom built piezo-based contact microphones that were waterproofed with heat shrink plastic (to create low-cost hydrophones). This allowed submerged impressions of water (freezing and defrosting) to be captured[137] without the worry of damaging expensive

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[136] In 2010, Mexico celebrated both the 200th anniversary of its independence and the 100th anniversary of its revolution, which part of the recordings would have captured, but it is not evident in the fabric of the sonic material.

[137] Jez Riley French (JRF) Hydrophones were initially used, and later my own incarnations of this model were created. Information on JRF is available at: <http://hydrophones.blogspot.co.uk/>.

equipment. In the recording process, four hydrophones were carefully positioned under water, and subsequently frozen inside of the ice. The initial recording of the sound of ice freezing and defrosting uncovered a micro sound which involved pops, clicks, squeaks and squeals generated by air escaping from the water as it became ice. Underlying the freezing process there would often be a dominant drone-like texture made by the fridge freezer motor, which also became a feature of the work. Capturing the defrosting process involved leaving the container with frozen water (and suspended hydrophones) on a windowsill outside, while continually recording. This process subtly unveiled the outside soundscape contaminating the natural process (or sound of the ice melting), which subsequently became a indirect feature of the work. The frozen hydrophones picked up traces of dominant sounds from the environmental soundscape, which includes the sound of passing vehicles. Although recorded sounds like the general ambience of the surrounding environment can be identified during less active periods of the defrosting ice recording, it is actually quite difficult to identify or recognise the source of the environmental sounds in the discourse of the work.

The characteristics of the recording were shaped by the characteristics of the microphones, which are designed to pick up the vibration of sound through solid objects. Because of this, the four individual monophonic sound fields mostly produced singular sounds events that did not cross over into the (four) separate sound fields. Although this was dynamic to experience in itself, if directly translated to the octophonic speaker array (i.e. Mono 1 - Speakers 1&2, Mono 2 - Speaker 3&4, Mono 3 - Speakers 5&6, Mono 4 - Speakers 7&8) the balance of amplitude and events was sometimes weighted towards a speaker pair. In attempting to create a cohesive or balanced octophonic sound field from the localised impressions, a few spatialisation strategies were employed to create crossover events in the individual speaker pairs. The crossover events were created by routing a single monophonic impression of a particular sound or events to every speaker, and dynamically treated with vector based panning to create a sense of moving sounds or events. These strategies are simply used to provide a link between each of the sound fields or speakers in

the octophonic array, although it can be difficult to identify this type of strategy because the crossover events are always juxtaposed with an edited impression taken from the source recording. The compositional process generally involved condensing and enhancing characteristics or features of the source recordings, i.e. the sound of ice freezing or defrosting, the drone of the freezer and (to an extent) the subtle sound of the surrounding soundscape. This is a consequence of the relatively uneventful characteristics of the durational[138] recordings, and, probably more relevant, the size of the container[139], which was limited to the size of the freezer compartment. As a result, subsequent recordings were treated and time-compressed through aural selection and layering in the sequential spatialisation fashion, e.g. the impression of a space could be made from a ten minute recording, split into (four) two and a half minute sections, each routed to the four stereo speaker pairs in the octophonic speaker array[140]. For example, Figure 26 is made from four monophonic recordings (i.e. Channels 1&2 - Mono 1, Channels 3&4 - Mono 2, Channels 5&6 - Mono 3, Channels 7&8 - Mono 4). Each mono impression is routed to a speaker pair in the octophonic speaker array. In the spectrogram (i.e. Figure 26) it is possible to see crossover sound events in each of the stereo impressions, although it is also possible to see quite a few sonic events that do not crossover to the other (speaker pairs) sound fields. The sounds that cross over onto each of the sound fields (or speaker pairs) merge the overall octophonic image, providing flashes of coherence to the otherwise unconnected (octophonic) sound field. Secondly, Figure 27 demonstrates another incarnation of this process, although the octophonic sound field is more dynamic because of an increased level of audio layering (or time lapsing). The crossover events in this snapshot are more frequent and dominant, which attempts to create a more dynamic octophonic impression created from the monophonic source.

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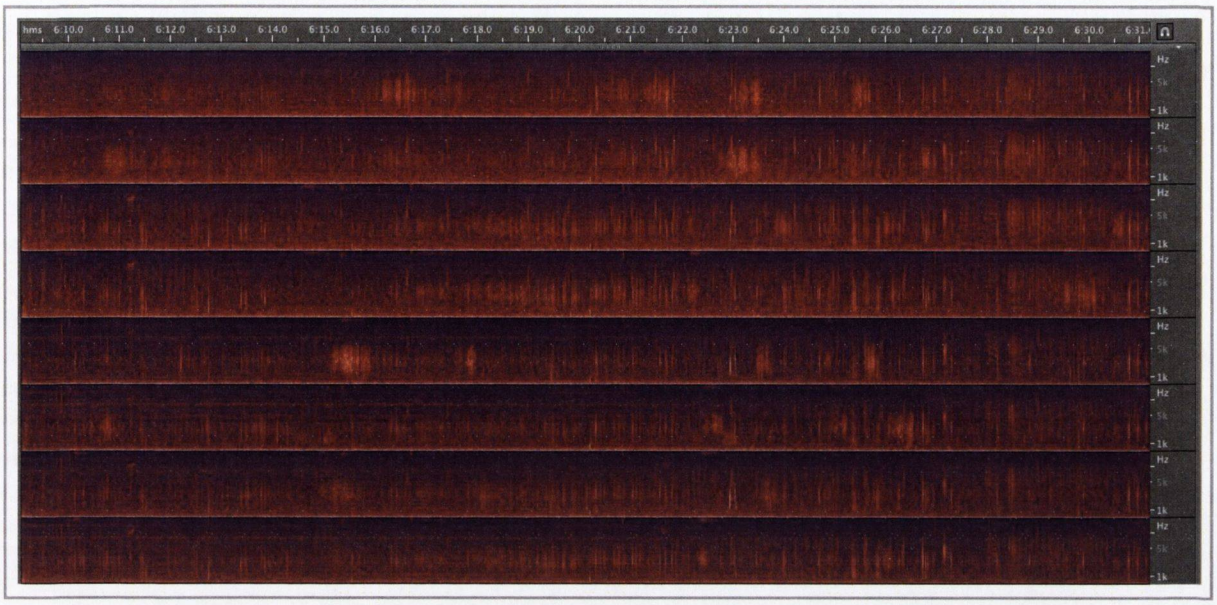
[138] The duration that it took for the water to freeze or defrost varied, but averaged in the region of four to five hours.

[139] If one listens to recordings taken from larger planes of water, more defined features can be heard. It would have been more dynamic if larger bodies of water were explored, but this was not possible with the equipment on hand at the time of the composition. A good example of the sound of larger bodies of ice or frozen water would be Chris Watson's recordings from Antarctica, made for the BBC's 'Frozen Planet'. Available at: <http://goo.gl/evsVy>.

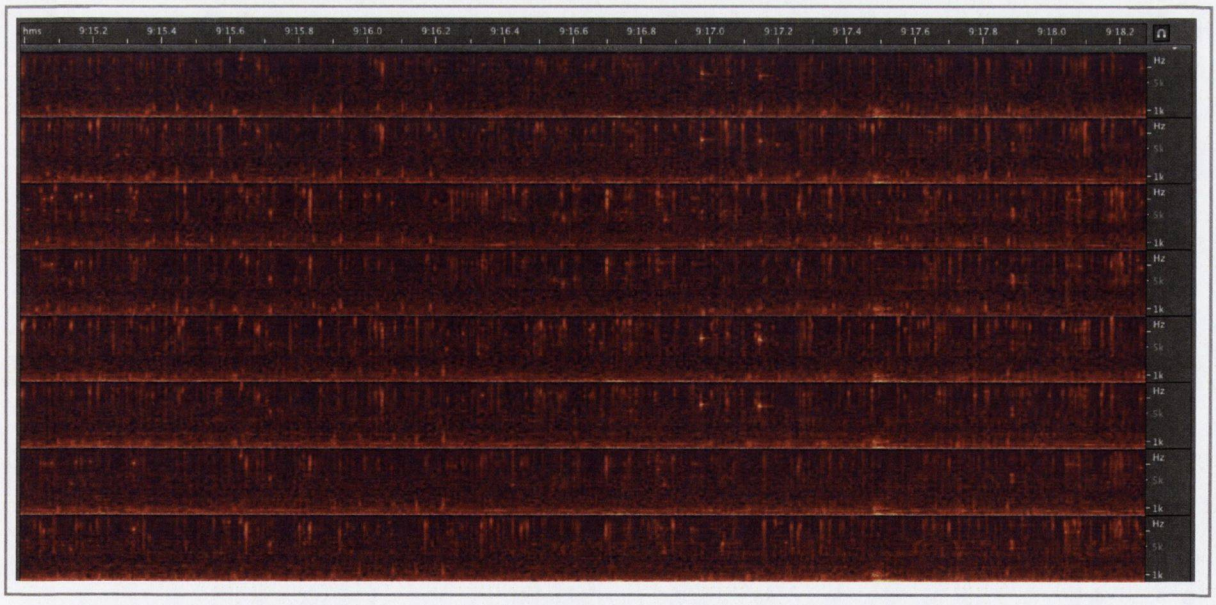
[140] This octophonic spatialisation technique is deliberated in more detail in the compositional methodology section.

Figure 25. '*Tempest in a Teacup*': Individual and Crossover Events



The sound field was created from four monophonic sources which were individually routed the each of the speaker pairs, (N.B. from the top down each track represents the individual channels/speakers e.g. 1, 2, 3, 4, 5, 6, 7, 8). Although it was possible to gain a good octophonic impression of the freezing process from this, to create a better sense of cohesion and balance through the octophonic speaker array, crossover events were added. This involved projecting the same (mono) source into each of the speakers. For Example, in the spectrogram, it is possible to see crossover events at 6.11, 6.165, 6.23 and 6.27-6.285.

Figure 26. '*Tempest in a Teacup*': Extended Individual and Crossover Events



The sound field was created from using the four monophonic sources, although through using layering (and time lapsing), the sound field becomes overly animated, creating a much more dynamic timeline, (N.B. from the top down each track represents the individual channels/speakers, Mono 1 - Speakers 1&2, Mono 2 - Speakers 3&4, Mono 3 - Speakers 5&6, Mono 4 - Speakers 7&8. In attempting to create sonic events that crossover into the individual speaker pairs, a single monophonic source was routed to every speaker. This attempts to provide flashes of cohesion across the octophonic sound field. The crossover events can become difficult to identify in the overall sound field because of the dynamic nature of the (overly) animated sound field. For Example, these events are visibly noticeable in the lower spectrum at 9.15.9 - 9.16.2, 9.17.0 - 9.17.5.

In performance, the listener is given a suggestion of the composition's sonic-image or the discourse explored which involves recordings of freezing and defrosting water, although the final sonic-image is not described in detail to provoke the listener into identifying the sounds they encounter. The organisation processes have exaggerated the characteristics of the recorded events, resulting in the source material manifesting itself in overly animated octophonic configurations In this sense, the work attempts to create a hyperreal impression of the freezing process, which can be likened to programatic music but without the (direct) indication or formalisation of a programatic text (or setting) in an attempt to challenge the listeners imagination into defining the sonic-image.

Chapter Four

4.1 Coda: Closing Remarks

In coming to some form of a conclusion, the closing discussion is somewhat general in summarising the overall philosophy of the compositional methodologies explored through the portfolio of work. The chronological timeline of the works provides an overview of the different kinds of approaches that developed as the creative practice evolved. This is particularly evident when comparing the first (i.e. '*Tidal Streams*') and last (i.e. '*Empire Drive*') compositions. '*Tidal Streams*' explores the process of creating a highly synthesised metaphoric sound world from a range of different sources (taken at different times), and '*Empire Drive*' involves the framing of a particular time and place through a time-condensed representation of the environment. At the outset, sound design and contextual frameworks were the main strategies for forming compositional stimulus and, in coming full circle, and exploiting the phonographic practices to create musical languages, '*Thoroughfares*' deliberately blurs the boundaries between phonography and sound design. The extensive use of phonography (e.g. '*Thoroughfares*') enabled direct acoustic references to be portrayed with more musical (and acoustic) detail (in the octophonic speaker array), avoiding the need for extreme contextual setting, abstraction and metaphor. These works demonstrate the developments in approaches to exploring sonic-images. At one extreme, the controlling and detailed articulation of recorded sound, and at the other, the framing of a particular period of time with phonography; a middle ground between these two kinds of hyperrealities, '*Thoroughfares*' (and to some extent '*Tempest in a Teacup*') creates a contextually framed sound field through multiple instances of the (multichannel) phonographic process.

On reflection, there was a need to come to terms with the organisational processes involved with phonography because it was, perhaps, difficult to see the compositional merit in framing a place through imposing organisational structures on recorded space and time, because the predetermined

structure or frame would override the aesthetic compositional approach. This kind of organisational process did not allow for the recorded sound to be composed or controlled in as much detail as a highly synthesised environment, and therefore did not allow for sound to be controlled and articulated through organisation or production. The compositional framework seemingly involved less of a bottom-up organisational methodology, meaning that the source recordings were not controlled through highly detailed synthesis, rather, through aural selection and temporal scripting. At the outset, the focus was on experimenting with sampling sound, generally through exploiting and transforming the inherent sonic qualities by spectrally controlling or transforming the sound through digital signal processes or chains. Initial attempts at creating unique sound worlds[141] avoided using direct references, and these did not utilise the full potential of the phonographic process. Gaining practical experience, phonography developed the organisational processes and range of sonic-images explored and, subsequently, the focus shifted towards exploiting the identifiable characteristics and the spatial qualities inherent in the sonic-image. Conversely, context and programmatic themes are also an inherent part of the recording-led works, '*Empire Drive*' and '*Vivified*', because they frame a specific period of time (the 12th of July) in Northern Ireland. Through gaining or having an understanding of the surrounding context of this period of time, this would allow for a better understanding of the sound fields explored in the works.

The comparisons between the compositions do not highlight the interest in octophonic (recording and spatialisation) practices. The best evidence of this investigation comes from the sequential spatialisation and the multi-device recording methodologies. The sequential spatialisation strategy provides a manual method for diffusing stereophonic imagery over octophonic speaker arrays. Although it is entirely possible to replicate these processes with programming languages to create automatic results, the benefits of this methodology become apparent when examining the reactive

[141] In a lot of ways, this kind of compositional process can be likened to the process of shuffling a deck of cards. Every shuffle of the deck will be unique, but it is highly likely that everyone in the room will have seen every single one of those cards before, just not organised in that particular order.

aural process for discerning convincing musical materials. Moreover, the multi-device recording methodology allows unconnected recording devices to be synchronised, which allows uncommon arrays over large distances and difficult terrains to be aligned in playback; the experiments carried out were performed with stereophonic impressions because this was the most accessible equipment available, although the methodology could be applied with more complex microphones and configurations, e.g. Ambisonic microphones, stereophonic recording setups proved the most practical (and portable) solution.

After spending time with the phonographic process, it is safe to say that in the act of recording there will always be a certain amount of aesthetic choice and decision, (the equipment choice, the recording duration, the microphone placement, the number of microphones etc). The composer's (or engineer's) aesthetic will inform sound selection and production techniques, but, during the recording, it is impossible to compose the sound of an environment. At best, these things are naturally forming, dynamic and organic. The commentaries are organised to reflect the development of the creative practice and the works are not discussed in chronological order, but structured to reflect the impact of phonography (i.e. Chapter 2) on the hyperreal sonic-images (i.e. Chapter 3) created. The experienced gained from forming these works became invaluable for developing knowledge and skills in phonography, and as the influence of phonography developed, the compositional languages became more removed from the initial styles and concerns which were foremost focused on forming highly complex sonic languages from recorded sound. In extending the phonographic platform, the kinds of sonic-languages produced changed from being abstract and metaphorical to directly referencing multichannel (spatially complex) impressions of the real-world. In discussing the shift in focus, from using abstract and metaphoric sound to direct reference through phonography, it can be easy to become obsessed with the finer details of an abstract work, and loose the over-all perspective of the sonic-image. This becomes particularly apparent in performance, where listeners can ignore detailed musical information; it is entirely possible to make

every sound important to the overall schema of the work, but the act of listening can be unpredictable and, depening on the listener's experience, the finer details (or source-bondings) of a musical event can be sacrificed for larger musical events.

If we are to express the notion, music is a form of language, there must be different levels of understanding between different people, as is the case with any form of language. Music (and specifically my composition) may not affect people (or listeners) in the same way as it effects me. Much like any spoken language, organised musical languages may take time to understand, learn and appreciate. I have not always experienced the visceral qualities of sound-based languages (described in the third chapter), but I have become very aware of its visceral and communicative power through my compositional interests. It is likely that what has resonated with me (as a composer) will not, necessarily, resonate with another listener, but that is a chance the author (and composer) has to be willing to take. In some respects, over the evolution of this compositional portfolio the author has been an unashamed sonic tourist[142], in constant search of creating and experiencing the 'perfect' hyperreal sonic experience.

The primary ambition at the outset was to create a body of new music, in the acousmatic domain. After going through this process, it is my current opinion that there is not, nor a need for a definitive framework, infrastructure or guidelines that directly relate to the use of discernible phonographic sound in electroacoustic music, and in a similar vein there is not a definitive problem or issue that is tackled through this research. The possibilities for composing with, and exploiting, recorded sound to form music still seems endless. Because of this, there is a sense that the body of work and the (musical) potential in the (multi-channel) processes explored has only really scratched the surface of this creative platform. I can only hope that through my compositional work, others will be exposed and enthused by this exciting musical platform - this does not have to happen in a concert

[142] Drever, J-L. 'Soundscape composition: the convergence of ethnography and acousmatic music', Organised Sound, Volume 7, Issue 01, April 2002, pg 21 - 27.

hall because I have gained incredibly visceral listening experiences through shutting out the outside world with headphones.

Looking to the future, I am confident that the compositional ideas, themes and approaches explored in this body of research can be built upon and further developed. I am still fascinated by the process of composing with (mimetic, Emmerson, 1987) sound, and there is a strong sense that sound-based languages will always be a dominant force in my compositional approach and future research. It will probably take time to reflect on and develop my creative practice, but I am still thoroughly excited by the prospect of composing more music with the language of organised sound. The continuing challenge (and opportunity) for me, as a composer interested in sound based-composition, is to use my artistic lens to find new perspectives for the process of organising sound. And so, back to continuing the search for the perfect soundscape.

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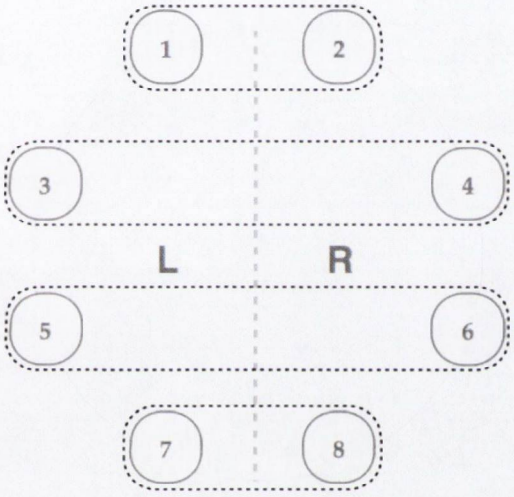
Appendix

I. Australian Computer Music Conference: Tidal Streams Diffusion Notes

Diffusion Instructions: Tidal Streams

Tidal Streams was written in stereo, but the work can be diffused over any speaker array. The instructions relate to the diffusion process over an octophonic speaker array, although, it is entirely possible to adapted the ideas explored in a different speaker configuration.

The Octophonic Speaker Array



1&2 (front speakers)

3&4 (front-middle speakers)

5&6 (back-middle speakers)

7&8 (back speakers)

II. Tidal Streams: Diffusion Timeline

Time (Min)	Action
0.00	Start with speakers 1&2 only
0.20	Start gradually fading up speakers 3&4 The speakers should be at full volume by 0.45
0.45	Start gradually fading up speakers 5&6 The speakers should be at full volume by 1.22
1.20	Start gradually fading up speakers 7&8 The speakers should be at full volume by 1.46
2.28	Snap down speakers 5&6 and 7&8
3.00	Gradually fade speakers 5&6 and 7&8 up The speakers should be back at full volume at 3.55 through until 4.43
4.43	Create a wave-like effect with the faders/speakers. The effect is created using speakers 3&4 and 5&6 - speakers 1&2 and 7&8 are left up at all times. The effect is achieved by repeatedly shifting a weight in amplitude between the left and right speakers (in paris 3&4 and 5&6). This is not a fast process, it should be smooth and steady.
5.29	Gently snap/fade down 5&6 and 7&8
5.45	Gently increase the volume on speakers 5&6 Speakers should be at full volume by 6.00
6.00	Gently increase the volume on speakers 7&8 Speakers should be at full volume by 6.29 through until 7.00
7.00	The wave like effect described above can be used in this section also. This time should be even subtler than before.
8.00	Start fading down speakers 7&8 Speakers should be down by 8.25
8.40	Start fading down speakers 5&6 Speakers should be down by 9.00
9.00	Start fading down speakers 3&4 Speakers should be down by 9.20
9.20	Leave 1&2 up to the end of the piece.

Programme Notes

Tidal Streams

'*Tidal Streams*' attempts to create a surreal sonic journey through the powerful tidal currents of the sea. The synthetic sound world explored was inspired by the notion of Tidal Streams, which is the horizontal movement of water that's speed and direction varies according to the state of the rising and lowering tides. The listener is invited (and almost challenged) into creating their own imaginary journey through the sonic liquid landscape.

Tryst

'*Tryst*' incorporates contemporary dance with real-time digital signal processing and sampling. The piece stands as a commentary on the importance of gesture as a choreographic device in the context of Western classical piano performance. It seeks to deconstruct the sociological strictures of classical culture while at the same time providing the philosophical stance of performance as a mode of seduction. Within this, the relationships humans form with objects are used as a metaphor for desire in which the inner conflicts of the performer are revealed. (Newland, McIvor and Bird: 2009)

PLAY

'*PLAY*' portrays the state-of-being arising during piano improvisation. Following a climactic trajectory, the film draws upon the metaphor of feminine jouissance to explore musical experience as an erotic/transgressive act, beginning with the sense of touch and increasing in intensity to full bodily participation. Through combining footage of dance and piano improvisation in an ambiguous manner, '*PLAY*' explores music as a sensuous and essentially corporeal activity that results in a momentary illusion of symbiosis between body and instrument.

Everyday Mimesis; Grey Day

'*Everyday Mimesis; Grey day*' explores the practice of recording and exploiting the everyday soundscape as source material for fixed media octophonic composition. The compositional process is directly influenced by naturally occurring events, which is implied by the double-barreled title:

'Everyday Mimesis' refers to the process of capturing the everyday soundscape with digital recording equipment, and then using the source material as the foundation and inspiration to create an octophonic work of sonic art (mimesis, is defined as the representation or imitation of the real world in art or literature); *'Grey Day'* refers to a colloquial phrase that describes inclement, dull or rainy weather, which is a common occurrence in the Northern Irish climate.

Vivified

'Vivified' is an octophonic representation of the soundscape in South Belfast during the 11th and 12th of July, 2010. The composition explores using quadrophonic field recordings from in and around a derelict building to create a spatially animated and time-condensed account of the events that took place during this time. *'Vivified'* is not considered as a factual account of this period of time, even though the compositions discourse is based on the reality of the goings on within the suburban location explored. *'Vivified'* can be understood as an artistic response to the set of field recordings collected over the two day period. There was no motivation to capture the controversy of the goings on within the environment during this time, it just provided a dynamic urban soundscape, for a multichannel location recording to explore.

Tempest in a Teacup

The octophonic fixed media composition *'Tempest in a Teacup'* is formed from a set of recordings that attempt to capture the sonic process of water freezing and defrosting. The title *'Tempest in a Teacup'* is utilised to imply the idea of taking a small event and exaggerating it out of proportion, which is a direct reference to the way in which the source material was recorded (i.e. capturing small events) and utilised in the composition process (i.e. exaggerated out of proportion).

Thoroughfares

Thoroughfare is a term used to describe a place of passage or a transportation route from one location to another; i.e. roads, motorways and footpaths are all considered as being thoroughfares. Broadly speaking, on a macro level the composition *'Thoroughfares'* attempts to define the City Center of Belfast as a large-scale thoroughfare in itself, whilst on a micro level sections of the

composition investigate, explore and portray different locations that could be defined as thoroughfares. Therefore, the discourse explored in the composition does not necessarily explore a representation of a single thoroughfare or location as such, rather a collection of locations and situations that could be considered as being thoroughfares are the focus of the work.

Tacet

The composition *'Tacet'* experiments with using low frequency sound or bass, generally known as infrasound. As you read this programme note about the composition, you are being exposed to infrasound frequencies. Even though infrasound is considered out of the human hearing range, it is still highly perceivable as you can probably tell from listening to it right now. It has been said that frequencies lower than 20 Hz can cause hallucinations and previously reported that is can be the cause of many paranormal apparitions. This is the result of the effect infrasound has on different parts of the body, which affects the way it functions; the resonant frequency of the eye is 18 Hz according to NASA. In discussing infrasound and the body, as you are experiencing infrasound at this very moment in time, *'Tacet'* also attempts to draw attention to your internal soundscape, which is currently being subjected to infrasound frequencies between 19-20 Hz. As a consequence of this process, your body may feel a sense of pressure in the room, and because of this, you may become more aware of your internal soundscape. Your internal soundscape is made up of bodily functions that you are not constantly thinking about (or consciously aware of). As a result, you may become more aware of the sound of your heart beat in certain parts of your body, become more focused and aware of the process and sound of breathing, and other bodily functions such as swallowing may appear to become louder.

Empire Drive

As a Welsh exile having moved to Belfast, Northern Ireland, I have come to find the traditional culture, customs and practices of the Northern Irish fascinating; although I am not particularly motivated to participate in all events associated with the culture, I have been a keen to observe the traditions during the time spent living in (South) Belfast. At particular times of the year, the soundscape (and landscape) changes dramatically according to customary calender events; namely the public holiday periods, over the 11th and 12th of July. Since moving to Belfast, I have

attempted to record this period of time every year; using differing methodologies, recording processes and with different levels of success each time; *'Empire Drive'* was formed and framed as a result of this process. *'Empire Drive'* may only be understood as a representation of the environment during this time, as the recording and organisation processes involved decisions that were aesthetically guided.

List of Performances

Composition	Venue/Event	Date
Tidal Streams	*Sonorities Contemporary Music Festival, Open Fader, SARC, QUB Belfast*	May. 14th 2009
	Australian Computer Music Conference, Queensland University of Technology	Jul. 12th 2009
	(ESTA CASA ESTA SONADA) (This House Is Making Sound)	Mar. 5-6th 2010
	Sonic Arts in Wales Symposium, Royal Welsh College of Music and Drama	Mar. 25th 2010
	International Computer Music Conference, Huddersfield University	Mar. 17th 2011
PLAY	*Conference on Interdisciplinary Musicology*	Oct. 29th 2009
Tryst	*Royal Scottish Academy of Music and Drama (Including a talk on the realisation of the work after the performance)*	Jun. 18th 2009
	Sonic Arts and Research Centre, Queen's University, Belfast	Jun. 25th 2009
	Deep Space - Ars Electronica	Oct. 19th 2009
	Belfast Culture Night	Sept. 25th 2009
	Conference on Interdisciplinary Musicology in Paris	Oct. 26th - 29th 2009
	Outside IDSA - Shipping Create	Aug. 30th 2009
Thoroughfares	*Centro Mexicano para la Música y las Artes Sonoras (CMMAS)*	Sept. 13th 2010
	(ESTA CASA ESTA SONADA) (This House Is Making Sound)	Mar. 5-6th 2010
Tempest in a Teacup	*Eisteddfod, Visual Arts Exhibition, Vale of Glamorgan*	Aug. 1st - 4th 2012